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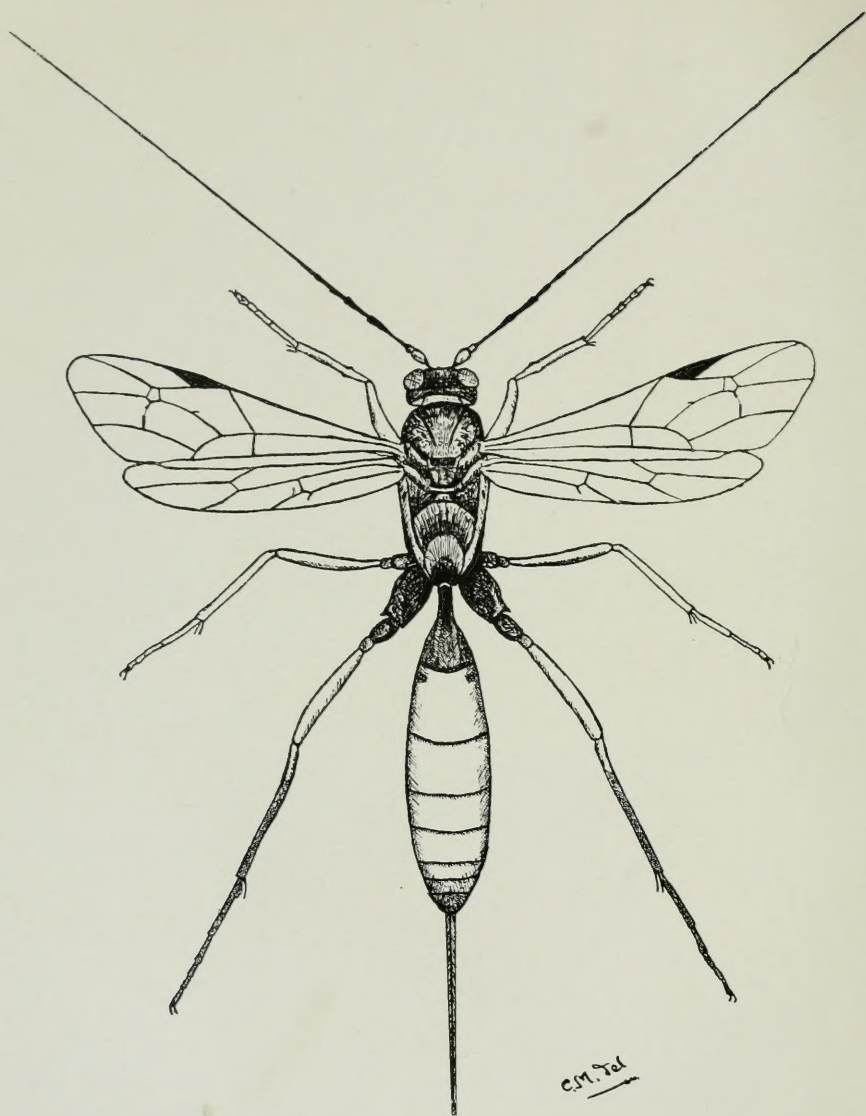
ENTOMOLOGY
DEPARTMENT

BIOLOGY

JAN 9 1964

BRITISH ICHNEUMONS

CRYPTINAE



Cryptus obscurus, Grav., ♀.

Ichneumonologia Britannica. ii.

THE

ICHNEUMONS OF GREAT BRITAIN

A DESCRIPTIVE ACCOUNT OF THE FAMILIES, GENERA AND SPECIES
INDIGENOUS TO THE BRITISH ISLANDS, TOGETHER WITH NOTES AS TO
CLASSIFICATION, LOCALITIES, HABITATS, HOSTS, ETC.

BY

CLAUDE MORLEY, F.E.S.

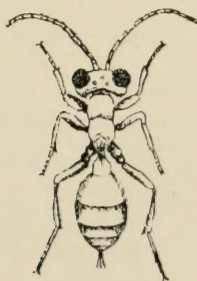
Author of "The Hymenoptera of Suffolk"

"Ichneumoninae of Britain"

etc., etc.

CRYPTINAE

Finis creationis telluris est gloria Dei ex opere naturae per hominem solum.—LINN.



Pezomachus pilosus, Capron

PRINTED (FOR THE AUTHOR) AND PUBLISHED BY
JAMES H. KEYS, WHIMPLE STREET, PLYMOUTH

MCMVII.

PREFACE.

IT is three years to-day since I wrote the preface of the "Ichneumoninae," and it is most encouraging to notice the very great increase in interest which has become evident in our British Ichneumonidae during the interval. It is not the blatant interest which rushes into print, but the careful plodding of the very few who approach Entomology with the sole aim of furthering it as a Science and of illuminating those many dark spots which still exist in the knowledge of our insular Insecta. Exclusive specialization is a thing to be fought against by all broad-minded, or rather broadly observant collectors, and it is undoubtedly to this cause we owe so very few works treating of specialized subjects, not only here, but throughout the entomological world; for specialization usually indicates lack of interest in the general subject. Some of the reviews called forth by the "Ichneumoninae," not one of which was written by a man with the remotest knowledge of the subject, were amusing, and in some cases it was most beautifully "damned with faint praise." Little fault was found on the whole, however: one reviewer thought it not sufficiently popular, which is a matter of education, another that the title was misleading, which is a matter of opinion; further I saw Braconidae and Chalcididae included in one review (this was not the fault of the title), and another clamoured for a transcription of the "original description" of the author of every species, though immediately afterwards owning that that same description would probably apply with equal exactitude to a dozen distinct present-day species.

I may here briefly sketch my *modus operandi*. I take a large sheet of paper and copy upon it the fragmentary points given in the "original description," adding each detail of that particular species, in its proper

place in my uniform scheme of description, as more and more details are given by the subsequent authors consulted in turn (paying especial attention to those who examined the type specimens). Having obtained as perfect an account of the species as is available, I proceed to firstly compare with it any insects I may possess purporting to belong to that species, and secondly to identify from it and them my own insects. Having satisfied myself upon the correctness of this identification, I am enabled to fill in any omissions in the published descriptions which appear necessary or advisable, and to add such points as strike me as aids to determination. What want we then with the ambiguous, inadequate and often useless original description? Cf. Verrall's "*Pulex pallide piceo-fusca*!"¹

The only alteration in the present volume is the fuller references to the details of economy and capture, which one reviewer wisely requested; these were omitted in the previous volume, because in every case I satisfied myself that no more could be learned by conferring the source whence I took them. It is also worthy of note that, though hundreds of specimens have since passed through my hands, not a single addition to our indigenous Ichneumoninae has hitherto been noticed. The opposite sex of one species has, however, been for the first time described² and a misnomer corrected.³

On the whole the Continental notices were much more satisfactory than the home ones, and the author is sure that in its broadest sense, "Heller ikke i entomologiske Boger fornaegter Englaendernes praktiske Sans sig."⁴

It is a great pleasure to me to again thank those who have so very kindly assisted me in the elucidation of the present volume, for "*Ichneumonidum cognitio natura difficilis et spinosa est*," and it is only by consensus of observation that we can arrive at a thorough knowledge of

¹ Presidential Address, Ent. Soc. 1900.

² "On *Barichneumon heracleanae*, Bridg., with a Description of the Male" (E.M.M. 1904, p. 37).

³ "*Ichneumon inquinatus*, Wesm., and *Amblyteles microcephalus*, Steph." (*lib. cit.* p. 239).

⁴ Review in "Flora og Fauna Aarbog" (Silkeborg; 1904, p. 56).

our native Ichneumonidae. I thank Miss E. M. Alderson, Rev. C. D. Ash, F. C. Adams, E. R. Bankes, the late A. Beaumont, M. Beathe, E. C. Bedwell, W. H. Bennett, Col. C. T. Bingham, Rev. E. N. Bloomfield, A. C. Bowdler, R. C. Bradley, E. Brunetti, E. A. Butler, Prof. J. W. Carr, Dr. R. T. Cassal, H. J. Charbonnier, Miss E. Chawner, A. J. Chitty, W. G. Clutten, E. A. Cockayne, C. W. Colthrup, J. W. Cross, A. A. Dalglish, C. H. Davies, F. H. Day, Horace Donisthorpe, Stanley Edwards, E. A. Elliott, Willoughby Ellis, W. W. Esam, W. Evans, E. A. Fitch, R. Godfrey, J. G. Gordon, A. H. Hamm, O. E. Janson, S. Kemp, J. H. Keys, A. W. Luff, G. F. Lyle, J. R. Mallock, A. H. Martineau, Rev. F. D. Morice, J. F. Musham, E. A. Newbery, Rev. O. Pickard-Cambridge, Albert Piffard, G. T. Porritt, R. M. Prideaux, E. Ransom, N. M. Richardson, G. B. Routledge, E. Saunders, Dr. D. Sharp, A. Sich, F. W. Sladen, Rev. A. Thornley, B. Tomlin, W. H. Tuck, H. J. Turner, C. J. Wainwright, J. Waterston, C. J. Watkins, F. J. Whittle, Col. J. W. Yerbury.

CLAUDE MORLEY.

MONKS' SOHAM HOUSE, SUFFOLK,

May 1st, 1906.

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INTRODUCTION.

IT is by no means surprising that the old authors quite failed to do any good work upon such closely allied and puzzling insects as those constituting the Cryptinae, and even Gravenhorst's tomes would have been practically useless were it not that his types remained available for subsequent authors to elucidate. Thus we find nothing of value was published between 1829, when his European Ichneumons appeared, and 1865, when Taschenberg redescribed his types with greater attention to their structural features, except a few notes on economy by Bouché in 1834, Boudier in 1836, and Ratzeburg in his confusing and, even now, but little explored mine of observation, *Ichneumonien der Forstinsekten*, 1844-50. Other papers on the subject of secondary importance were contributed by Boie and Doumerc in 1855, Tappes, Sichel and Kawell in his account of the Baltic fauna. Gravenhorst's curious apterous genus *Pezomachus*,¹ which he had foreshadowed in his *Monographia Ichneumonum Pedestrium* of 1815, was one of the earliest to attract attention, and was much too elaborately monographed by Förster in 1850-51 from the basis of the former's types; and this monograph, now sadly in need of revision, still constitutes the standard work upon the females of the genus, though augmented by Brischke and Bridgman. The stimulus given to the whole group by Taschenberg in 1865 soon became evident in Tschek's three valuable papers on the Crypti of Austria in 1870-72, and Brischke's general account from Prussia in 1877-82. The latter also added very considerably to our knowledge of their hosts in his district and was ably seconded by Dr. Giraud in this branch of the study in France. The figures of van Vollenhoven's *Pinacographia* excited interest in the beautiful coloration and graceful form of these parasites, and came at an opportune time to spur what may be called the temporary renaissance of their research in Britain. The intricate sub-genera into which Gravenhorst's unwieldy groups had been distributed by Förster in 1868 excited little notice, but Thomson's more natural genera, which began to be published in 1873, commanded more attention, and considerably simplified their discrimination. As the fasciculi of the latter's great *Opuscula Entomologica* appeared, it was seen that here was an all-embracing and perfectly workable scheme of classification, which was instantly adopted by all systematists; and notice was further drawn to it by its author's *Hymenopterous Notes* in the *Ann. Soc. France*. These new sub-genera and those of Förster were synonymized by Schmiedeknecht in 1890 and Ashmead in 1900. The whole of the two hundred palaearctic species of heterogeneous Hemiteles were redescribed by the former in 1897, and he is now publishing a short systematic account of the entire sub-family as

¹ It would be interesting to know to what species De Geer (*Mém.* vii. 38; t. iii. fig. 10, rr) referred as an apterous jumping Cryptus.

represented in Europe. The Stilpnini, consisting of the genera *Atractodes* (with *Exolytus*) and *Stilpnus* have held a most anomalous position; the former was at first included in the *Ichneumoninae* and the latter in the *Ophioninae*. Förster, however, recognized their relationship in 1876, and they were relegated to a position at the end of the *Cryptinae* by Thomson in 1884.

Turning to a consideration of what has been done in this sub-family in Britain, we find one or two kinds mentioned at the beginning of the last century by Donovan. Stephens, in September, 1835, classified *Stilpnus*, *Pezomachus*, *Hemiteles*, *Mesostenus*, *Phygadeuon*, *Cryptus*, *Echthrus* and *Atractodes* as British genera, but he enumerates as indigenous only five species of *Stilpnus* (as they still stand), twenty-seven of *Phygadeuon* (*sensu lato*), and fifty of *Cryptus*, the remaining genera being simply indicated. Two or three are noticed by Curtis as new, but these are now nearly all synonymized with those of older authors, and Haliday described sixteen supposedly new kinds in 1839. These latter are interesting, inasmuch as they have lain *perdu* ever since, and it is only now that they are first synonymized with those of other authors; the types are in the Dublin Museum. Smith and Desvignes contributed some notes on the economy of *Hemiteles* to the Trans. Ent. Society in 1859, and three years earlier the latter's British catalogue was published. Following Gravenhorst's nomenclature, he instances fifty-eight species of *Cryptus*, of which five are described as new, twenty-five of *Phygadeuon*, three of *Mesostenus* (including *M. transfuga*), fifteen of *Hemiteles* and twenty-three of *Pezomachus*, two of *Atractodes* and Stephens' five *Stilpnus*, giving a total of one hundred and forty-one species, of which many are synonyms. Rev. T. A. Marshall described two new *Phygadeuones* and several brachypterous forms in the E.M.M., and in 1870 published his Catalogue, which raised the British number to two hundred and fifty-four kinds (including *Mesostenus gladiator* and Förster's brachypterous genera). This was closely followed by the same author's Catalogue, published by the Entomological Society in 1872, which enumerates two hundred and seventy-one different kinds.¹ Then came a revulsion of feeling in favour of *Ichneumonidae*, which took the tangible form of Bridgman and Fitch's "Introductory Papers" in the *Entomologist*; notes and local lists also began to appear. Walker gave an account of those species which he took in the Isle of Man, Parfitt and Hellins and Bignell in Devonshire, Bloomfield and Butler about Hastings (embodied in my Vict. Hist. Sussex list), Wilson and Roebuck and Bairstow in Yorkshire, Dale and Pickard-Cambridge in Dorsetshire, Marquand in Cornwall, Bridgman in Norfolk and Capron in Surrey. Subsequently we have lists from Essex (Harwood, in Vict. Hist.), Johnson in northern Ireland, Luff in the Channel Islands, and my accounts of the *Ichneumonidae* of Cambridgeshire and Suffolk in the *Victoria History*. All these contributed to swell the total, till, in 1901, I found it to stand at three hundred and seventy British species of *Cryptinae*. It was very obvious, however, that among this mass was a great deal of synonymy regarding Förster's *Pezomachus*, his brachypterous genera in relation to macropterous *Phygadeuones*, and the opposite sexes in general. This I have endeavoured to obviate to the best of my ability, with the

¹ All the species referred to as doubtfully indigenous among the *Cryptinae* in this Catalogue by its author (Trans. Ent. Soc. 1872, p. 264), e.g. *Linoceras macrobatus*, *Nematopodius formosus*, *Catalytus fulvulatus* and *Agrothereutes abbreviator*, have now been abundantly confirmed.

material available, and the total number of kinds now presented is reduced through this cause to three hundred and seventeen species, distributed through forty-one genera, of which only seven species and two genera are new, though many of the species have not before been noticed in Britain.

A TABLE OF FAMILIES OF THE ICHNEUMONIDEA (PARASITICA).

(2).	1.	Abdomen emitted from metanotum.....	EVANIIDAE.
(1).	2.	Abdomen emitted from apex of metathorax.	
(8).	3.	Front wings with discoidal nervures.	
(7).	4.	Terebra rising from near apex of the usually deplanate abdomen.	
(6).	5.	Front wing with two recurrent nervures ...	ICHNEUMONIDAE.
(5).	6.	Front wing with one recurrent nervure ...	BRACONIDAE.
(4).	7.	Terebra rising from near base of the usually compressed abdomen	CYNIPIDAE.
(3).	8.	Front wing with no discoidal nervures.	
(10).	9.	Antennae of ♂ with some ring-like joints ; venter emitting terebra	CHALCIDIDAE.
(9).	10.	Antennae of ♂ with no ring-like joints ; anus emitting terebra	PROCTOTRYPIDAE.

A TABLE OF SUB-FAMILIES OF THE ICHNEUMONIDAE.

(4).	1.	First segment basally contracted ; areolet pentagonal.	
(3).	2.	Mesosternum deeply sulcate.....	CRYPTINAE.
(2).	3.	Mesosternum not sulcate	ICHNEUMONINAE.
(1).	4.	First segment not petiolate ; areolet not pentagonal.	
(8).	5.	Abdomen dorsally deplanate ; post-petiole broad.	
(7).	6.	Metanotum not longitudinally costate ; terebra exerted	PIMPLINAE.
(6).	7.	Metanotum longitudinally costate ; terebra not exerted	TRYPHONINAE.
(5).	8.	Abdomen laterally compressed ; post-petiole linear.....	OPHIONINAE.

The comparative frequency of brachypterous and apterous forms in the present sub-family, to which they are nearly confined among the Ichneumonidae, renders it more essential to notice the conformation of the basal segment than the shape of the areolet ; and it must also be remembered, in order to differentiate these parasites from the wingless Braconidae, that in the former the segmentation is flexible and the abdominal joints telescopic, while in the latter the central segments are connate and rigidly soldered together. An example in point is that of *Pezomachus Rosenhaueri*, Ratzeburg, which its author bred from the phytophagous coleopteron *Cryptcephalus minutus*, Fab., and which is placed by

Marshall in the Braconidous genus *Pambolus*, Hal. Even when of normal length, the wings of some of the genera of the Cryptinae have the pentagonal areolet imperfect, through the absence or weakness of the external nervure, and in a few species even the internal nervure is so short as to render the areolet very irregular.

In the classification of the Cryptinae, I have in the main followed Prof. Thomson's scheme, though in placing the Phygadeuonides before the Cryptides I think that Taschenberg, who treated the sub-family more as part of a whole than have the later authors, had more regard to the natural order. In their alar neurulation and usually fully developed metathoracic costae the Phygadeuonides certainly bear a closer analogy to the Ichneumoninae than do the Cryptides, on account of the often sub-quadangular areolet and obsoletely costate metathoraces of the latter. It has been truly said that Hemiteles is Phygadeuon in miniature, and wherever the latter be placed it cannot be separated from the former: if the Phygadeuonides be placed first, Hemitelini must next follow. As I have said elsewhere, *Pezomachus* is divisible into several genera, though I think it at present inexpedient to adopt the divisions; the antennal conformation must form the basis of these genera, some of which (the *Sylvicola* group) will be most closely allied to Phygadeuon, while others (the *Instabilis* group) will be closely related with the *Spinolia* group of Hemiteles. Till these genera be erected, however, it is better to place *Pezomachus*, on account of its lower development and the antennal conformation of the majority of its species, next after Hemiteloides. The question of the natural position of the Stilpnides is much more puzzling, if indeed such do at all exist; the shortly, and in some cases not at all, exerted terebra allies them with none of the present sub-family, but the apically incomplete areolet and small size resemble Hemiteles, while the curious conformation of the metathorax, with its comparatively few areae, the elongate form, and (in *Atractodes*) slender antennae are more comparable with the Cryptides. These latter, in their genera *Xylophorus*, *Nyxeophilus* and *Acroricnus*, bear such strong Pimplid facies that it appears most natural to place them at the end of the present sub-family, immediately preceding the sub-petiolate Xorides; and here, perhaps, I should also have included *Helcostizus*, a most specialized insect, forming, as has several times been pointed out, a connecting link between the Phygadeuonides and Cryptides.

If, however, one follow up this latter connection it leads to the conclusion that the Stilpnides are placed first or last, immediately after Ichneumoninae, with which they possess nothing but the concealed terebra in common or next before the Pimplinae, from which they too materially differ. And, further, that the curious apterous *Pezomachi* fall out of sequence entirely. On the whole, I consider it better to take the semi-circular view; the Phygadeuonides at the beginning falling in development to the Hemitelini and, finally, the *Pezomachini* (to the indeterminate condition of whose specific characters I have referred), then rising through *Stilpnus* with its short and stout antennae, *Atractodes* with its incomplete metathoracic areation and imperfect areolet, the *Mesostenini* with irregular areolet and peculiar areation, to the Cryptides, which, although highly developed, do not bear the full complement of metathoracic areae, and are consequently certainly most closely related to the Pimplinae. Our present classification is, however, notoriously superficial, and the above, it will be seen, is based purely upon facies.

SUB-FAMILY

CRYPTINAE.

A Table of Tribes.

- | | | | |
|------|----|--|-----------------|
| (4). | 1. | Metathorax with distinct longitudinal costae. | PHYGADEUONIDES. |
| (3). | 2. | Areola separated from petiolar area by a costa | STILPNIDES. |
| (2). | 3. | Areola and petiolar area confluent | CRYPTIDES. |
| (1.) | 4. | Metathorax with no longitudinal costae | |



Phygadeuonides.



Stilpnides.



Cryptides.

TRIBE

PHYGADEUONIDES.

The characters of the *Cryptinae* are far less satisfactory than are those of the *Ichneumoninae*; and, simple as it appears from the above table, the differentiation of the tribes is by no means easily placed in words, though their various points of dissimilarity are sufficiently apparent to the practised eye. I have already drawn attention to one great source of difficulty in the present sub-family, viz., the inclusion of both winged and apterous forms. It is necessary at the outset to say that many of the *Pezomachi*, and a few of the smaller *Phygadeuones*, in this condition have no trace of longitudinal metathoracic costae. That they do not belong to the *Cryptides* is, however, abundantly demonstrated by their comparatively incrassate antennae and shorter legs. All previous authors have agreed to separate the *Phygadeuonini* from the *Hemitelini* by characters of equal importance with those by which they are divided from the *Cryptides*, but I quite fail to agree in this separation,—indeed, if the mass of species found in our latitudes were of less unwieldy proportions, it would be more natural to make no distinction of the kind—for the characters usually indicated as distinctive consist simply of the areolet in the *Hemitelini* being more or less obsolete externally (a modification not always occurring therein, and occasionally found in the *Phygadeuonini*), of the former having the head less cubical (and all descriptions of shapes are exhibited in *Hemiteles*), and, which is a poor character, though the best at present discovered, the antennae and legs of *Hemitelini* are always much more slender.

From the *Cryptides* the present tribe may be distinguished by having the metanotum nearly always fully and completely costate, both longitudinally and transversely, by the petiolar area, which is always well-defined, being

sub-divided longitudinally by two costae, by the stigma of the wings being usually broader, the basal nervure more or less curved, and the costal abscissa smaller. From the *Stilpnides*, to which some *Hemiteles* and most male *Pezomachus* closely approximate, the distinct convexity of the metathorax at the point where it is normally bisected by the transverse costa will at once separate it, for in the former the metanotum is gradually declived throughout from base to the often produced apex.

SUB-TRIBE

PHYGADEUONINI.

Table of Genera.

- | | | | |
|-------|-----|--|-------------------------------|
| (30). | 1. | Basal abdominal segment not broader at base than apex. | |
| (3). | 2. | Metathorax with but one transverse costa | HELCOSTIZUS, <i>Först.</i> |
| (2). | 3. | Metathoracic transverse and longitudinal costae entire. | |
| (23). | 4. | Mesonotum not centrally sulcate. | |
| (24). | 5. | Petiolar area not reaching base of metathorax. | |
| (25). | 6. | Lower outer angle of discoidal cell not acute ; ♂ face pale. | |
| (12). | 7. | Metathoracic spiracles oblong or oval. | |
| (11). | 8. | Antennal scrobes obsolete ; tibiae finely spinulose. | |
| (10). | 9. | Frons very finely punctate | GIRAUDIA, <i>Först.</i> |
| (9). | 10. | Frons strongly punctate | COELOCRYPTUS, <i>Thoms.</i> |
| (8). | 11. | Antennal scrobes distinct ; tibiae strongly spinulose..... | PLECTOCRYPTUS, <i>Thoms.</i> |
| (7). | 12. | Metathoracic spiracles small and circular. | |
| (20). | 13. | Clypeus not apically bidentate ; abdomen mainly black. | |
| (15). | 14. | Head transverse ; abdomen strongly pilose | TRICHOCRYPTUS, <i>Thoms.</i> |
| (14). | 15. | Head not transverse ; abdomen normally pubescent. | |
| (19). | 16. | Mandibular teeth unequal in length ; head normal. | |
| (18). | 17. | Metathorax smooth or punctate | CRATOCRYPTUS, <i>Thoms.</i> |
| (17). | 18. | Metathorax rugose..... | DEMOPHELES, <i>Först.</i> |
| (16). | 19. | Mandibular teeth of equal length ; head sub-cubical | CUBOCEPHALUS, <i>Ratz.</i> |
| (13). | 20. | Clypeus apically bidentate or abdomen centrally red. | |
| (22). | 21. | Basal thoracic area not transverse nor apically convergent | MICROCRYPTUS, <i>Thoms.</i> |
| (21). | 22. | Basal thoracic area transverse and strongly convergent apically..... | ACANTHOCRYPTUS, <i>Thoms.</i> |
| (4). | 23. | Mesonotum deeply longitudinally sulcate centrally | OBISIPHAGA, <i>Morl.</i> |
| (5). | 24. | Petiolar area reaching base of metathorax | CREMNODES, <i>Först.</i> |
| (6). | 25. | Lower outer angle of discoidal cell acute ; ♂ head black. | |
| (27). | 26. | Scutellar fovea transcarinate centrally ; tibiae spinose..... | GLYPHICNEMIS, <i>Först.</i> |

- (26). 27. Scutellar fovea entire; tibiae not or hardly spinose.
 (29). 28. Facial pubescence normal; body not elongate PHYGADEUON, *Grav.*
 (28). 29. Facial pubescence dense and long; body strongly elongate PANARGYROPS, *Först.*
 (1). 30. Basal abdominal segment broader at base than at apex ORESBIUS, *Marsh.*



Discoidal cell obtuse.



Discoidal cell acute.

HELCASTIZUS, *Förster.*

Först. Verh. pr. Rheind. 1868, p. 186; *Cyrtocryptus*, Marsh. Tr. Ent. Soc. 1872, p. 259.

Head not narrowed behind the eyes; vertex centrally immarginate, cheeks sub-buccate; clypeus short and, in ♀, apically sub-membranaceous; labrum free and sub-triangular; mandibles not stout, apically contracted, with the lower tooth small. Antennae not elongate, sub-filiform; scape excised to nearly below its centre. Notauli distinct and somewhat short; mesosternal sulci not reaching centre; epinemia nearly entire; metathorax short, with but one transverse costa, before which the basal area is not transverse; spiracles small and circular. Abdomen of ♀ sub-clavate, of ♂ nearly linear, finely alutaceous throughout; basal segment only slightly curved, convex, with spiracles a little behind its centre¹ and no dorsal carinae. Tibiae sub-mutic; front ones of ♀ inflated and basally constricted. Wings with stigma somewhat narrow, areolet small and sub-convergent, all the nervures distinct to the outer margin; nervellus intercepted below its centre.

This genus contains but a single British species and is placed by Ashmead among the *Xoridini* on account of the sub-sessile abdomen, although its present position is that assigned to it by all other authors. Schmiedeknecht retains Taschenberg's name for it, which antedates Förster's by three years, and makes no mention of Marshall's, under which it has hitherto been known in Britain. Only one other species, *Heterocryptus maculatus*, Woldst., is included in this genus on the Continent. Among the Cryptinae it is as incongruous as is *Alomyia* among the Ichneumoninae, but no more natural position at present appears open to it. (Confer, however, Prof. R. Krieger in Zeits. Syst. Hym.-Dip. 1903, p. 292.)

1. *brachycentrus*, *Grav.*

Cryptus brachycentrus, Gr. I. E. ii. 457; Ste. Ill. Man. vii. 278, ♂ ♀. *Cyrtocryptus brachycentrus*, Voll. Pinac. pl. xli. fig. 5. *Mesocryptus brachycentrus*, Thoms. O. E. vi. 592. *Brachycentrus brachycentrus*, Schm. Opusc. Ichn. viii. 590. *B. pimplarius*, Tasch. Zeits. Ges. Nat. 1865, p. 106, ♂ ♀.

Head hardly narrower than thorax; vertex broad and not declived behind the ocelli; frons not prominent, dull, pubescent and finely punctate.

¹ Gravenhorst distinctly says "tuberculis lateralibus paulo ante medium sitis"; he considered the petiole to be the apex and the post-petiole ("pars antica") the base of the first segment.

tate throughout; clypeus short and hardly discreted; labrum white, narrow and apically acute; palpi infusate; ♂ with face and cheeks white. Antennae black with scape sub-ovate; flagellum filiform, hardly attenuate basally, of ♀ with joints six and seven white above; of ♂ with the tenth to the fifteenth acutely granulate below, and the scape white beneath. Thorax oblong, dull, finely punctate and pubescent throughout; epomiae obsolete; mesosternal sulci slender and not reaching beyond the centre; epimera glabrous; ♂ with prosternum and callosity beneath the radix white-marked; metathorax apically rotund, pleural costa distinct and transverse, angularly produced towards the base; coxal area wanting, the basal narrow and parallel-sided. Scutellum black, basally margined laterally, with its basal fovea neither deeply impressed nor striate. Abdomen very finely pubescent, sub-petiolate; first segment short and somewhat curved, broader apically and in ♂ linear; the second not transverse, with its epipleurae inflexed and spiracles contiguous with the margin; the fourth to the sixth gradually shorter, the seventh and eighth longer with the former basally sub-excavate; terebra straight, not slender and hardly longer than the hind metatarsus; ♂ with the ventral valvulae sub-spinosely compressed, ♀ with segments four to seven narrowly white-margined. Legs elongate, slender and, including coxae, red; posterior tarsi and the hind tibiae externally infusate, front tibiae whitish-testaceous and somewhat strongly inflated; ♂ with anterior coxae and trochanters white. Wings not clouded, radix and tegulae white, areolet rarely interstitial externally; discoidal cell with fenestra entire and its lower external angle, situated beneath the outer angle of the areolet, sub-acute. Length, 6-9 mm.

The almost sessile abdomen of this species lends it a strongly Pimplid appearance, and the short terebra and very small areolet all render it distinct.

Bridgman and Fitch say this species is not uncommon in Britain; and on the Continent, where it has been raised from *Saperda populnea*, it occurs in September throughout the northern and central regions. I have, however, never taken it, and the only females I have seen, are one in the British Museum collection, mixed with several incorrect males, and one in Marshall's collection, also in the British Museum, from Lasingham in Yorkshire.

GIRAUDIA, Förster.¹

Först. Verh. pr. Rheinl. 1868, p. 184; *Calocryptus*, Thoms. O. E. vi. 594.

Frons dull and finely punctate; labrum not free; lower mandibular tooth the larger; antennal scrobes obsolete; ♂ face pale. Flagellum of ♀

¹ *Ichneumon bellus* was thus described by Gravenhorst (I.E. i. 571) from a single ♀ sent to him by Hope, who captured it near Netley in Shropshire:—Antennae hardly half the length of the body, centrally white-banded; scutellum black. Abdomen oblong-ovate, as broad as the thorax, deplanate and strongly nitidulous; black, with segments two to four red, and the sixth and seventh obsoletely white dorsally; post-petiole gradually dilated towards the apex, longitudinally impressed and twice broader than the petiole; terebra not exerted. Legs normal, red; apices of the hind femora and tibiae, and all the tarsi, black. Wings clouded; areolet pentagonal; radix white, tegulae black. Length rather more than three lines.

Stephens in 1835 records it as "scarce; found near London in July"; but no one appears to have noticed it in Britain since then.

In his *Remarques critiques* on Gravenhorst's types in 1859, Wesmael says "il appartient au groupe des *Cryptus*," and that it should there form a distinct sub-genus on account of its short and inflated antennae, which are enlarged from the centre to the apex. In this respect it appears related with *Giraudia*, but the entirely concealed terebra points to a Tryphonid, rather than to a Cryptid, association. Till more is known of it, it were better not to place it in our catalogue; though an examination of the type, which may be in the Oxford Museum, should settle the question of the systematic position of this exclusively British species.

centrally incrassate. Mesonotum dull and finely punctate; epinemia abbreviated above, not reaching wings; metathorax sometimes basally, especially in ♀, obsoletely areated; basal area parallel-sided or very rarely transverse; areola complete and distinct; spiracles somewhat large and oval. Basal segment with no dorsal carinae. Tibiae not very distinctly spinose. Lower exterior angle of the discoidal cell neither acute nor further from the base than the centre of the areolet, its external fenestra entire. Size not small.

1. *congruens*, Grav.

Cryptus congruens, Gr. I. E. ii. 533, ♂ ♀; Holmgr. Sv. Ak. Handl. 1854, p. 51, ♂. *Phygadeuon congruens*, Tasch. Zeits. Ges. Nat. 1865, p. 41. *Calocryptus congruens*, Thoms. O. E. vi. 595, ♂ ♀.

Head sub-triangular, narrower than thorax; cheeks nitidulous and not buccate, palpi flavous; of ♂ with mouth and face flavidous-white; of ♀ with facial and vertical orbits, the not prominent epistoma, a mandibular mark and usually another on the apically truncate clypeus, red. Antennae of ♂ elongate, apically attenuate, black, with scape beneath and a central flagellar band white; of ♀ centrally incrassate and white-banded, basally rufescent (at least beneath) with scape infusate above. Thorax black, dull, very finely punctate and pubescent throughout; epomia and notauli short; a dot beneath, and in ♂ before, the radix testaceous; mesosternal sulci distinct, not reaching the centre; metathorax apically obliquely truncate, with the discreted petiolar area and sub-parallel-sided areola distinct; pleural costa very, coxal and lateral less, determinate; of ♂ dorsally sanguineous-marked. Scutellum, and sometimes in ♀ post-scutellum, flavous-white; of ♀ somewhat, of ♂ strongly, convex. Abdomen of ♂ elongate, of ♀ sub-oval, sub-convex, shining, obsoletely punctate and pubescent; red, with the apical three or four segments black; post-petiole of ♂ glabrous, gradually dilated apically, nearly twice longer than broad, of ♀ somewhat elongate, slightly curved, a little dilated apically, immarginate, finely pubescent with no dorsal carinae; segments four to six of ♀ with a prominent ventral fold, the sixth to the eighth retractile and the seventh dorsally pale, its terebra straight and rather shorter than the abdomen. Legs somewhat stout, red; all the coxae, excepting sometimes the front ones of the ♂ and marks on the hind ones in ♀, black; anterior trochanters sub-infusate above; hind femora nearly entirely black; anterior tibiae obviously, the hind ones hardly, spinulose. Wings fulvescent or sub-hyaline; areolet strongly convergent above; radix silaceous, tegulae infusate and sometimes centrally pale; nervellus intercepted far below its centre. Length, 8–12 mm.

This species, which is distributed throughout northern and central Europe, was first recorded from Britain by Desvignes in 1856, and it does not appear to have been since mentioned in any of the local lists or records. Both sexes are, however, represented in Dr. Capron's collection from the neighbourhood of Shere, in Surrey, and Marshall has captured females at Botusfleming, in Cornwall.

COELOCRYPTUS, Thomson.

Thoms. O. E. vi. (1874), 597.

Frons strongly punctate with scrobes obsolete; labrum not free; cheeks sub-buccate and very short, of ♂ nearly wanting; mandibles elongate with

lower tooth the larger; genal costa continuous; ♂ face immaculate. Flagellum of ♀ centrally incrassate. Mesonotum sparsely and strongly punctate; epinemia entire and reaching wings; metathorax hardly areated, basal area indicated; spiracles somewhat large, oval. Basal segment with no dorsal carinae. Apical margin of the hardly spinulose hind tibiae truncate dilated and externally orbiculate; anterior obviously spinulose. Lower angle of the discoidal cell neither acute nor further from the base than the centre of the areolet, its external fenestra entire. Size not small.

Ashmead (Proc. U. S. Museum, 1900, p. 185) sinks this genus as synonymous with *Schenkia*, Först. (Verh. pr. Rheinl. 1868, p. 184), but I do not find that the latter's definition justifies this conclusion; moreover, Thomson gives *C. rufinus* as the only exponent of this genus, relegating *C. graminicola*, Grav., indicated as typical of *Schrankia* by Ashmead, to *Microcryptus*, and adds that "Troligen är Foersters *Colocnema* identiskt med detta släkte" (*Coelocryptus*).

1. *rufinus*, Grav.

Phygadeuon rufinus, Gr. I. E. ii. 681; Tasch. Zeits. Ges. Nat. 1865, p. 41, ♀. *P. erythrostictus*, Gr. I. E. ii. 714 et i. Suppl. 709; Ste. Ill. M. vii. 301; Tasch. Zeits. Ges. Nat. 1865, p. 44, ♂. *Coelocryptus rufinus*, Thoms. O. E. vi. 597, ♂ ♀.

Head narrower than thorax, shining black; clypeus transverse, coarsely punctate, apically truncate and sub-reflexed; palpi pale; mandibles of ♀ basally badius, of ♂ centrally flavous; ♀ with epistoma not prominent, with a rosy mark on either side. Antennae of ♂ attenuate and black with scape rufescent beneath, of ♀ infusate, centrally incrassate, with the eleven basal joints ferrugineous. Thorax sub-convex; epomia and notauli short; mesonotum and metathorax sparsely pubescent, the latter short and shining, of ♀ exareolated with the pleural costa entire, of ♂ with the quadrate areola, the discreted petiolar and basal area, complete; mesosternum short, laterally sparsely punctate and shining, its sulci somewhat deeply impressed and not reaching the centre. Scutellum black and somewhat convex. Abdomen hardly narrower in ♀ than thorax, shining and obsoletely punctate, of ♂ sericeous; testaceous-red, with segments five to seven and perhaps the base of the first black, the anal two in the ♀ retractile and bearing a whitish membrane; basal segment glabrous and nitidulous, elongate and slightly curved; post-petiole gradually dilated apically, hardly margined laterally, with no dorsal carinae though centrally foveolate; ventral fold prominent and the infusate terebra hardly half the length of the abdomen. Legs somewhat stout, red; coxae, trochanters, and the hind femora, black. Wings somewhat narrow and clouded; radix stramineous, stigma and tegulae fulvous. Length, 8–10 mm.

In size and conformation, particularly of the wings, it closely resembles *G. congruens*, from which the immaculate scutellum and the absence of the pale flagellar band will at once distinguish it.

Gravenhorst records the male from Netley in Shropshire and Stephens from near London in June. Dr. Capron has more recently taken it at Shere, in Surrey; but it does not appear to have been noticed elsewhere in Britain, nor to have been bred.¹

¹ The *Phygadeuon rufinus* of the British Museum collection is nothing but *P. fumator*, Grav. (7 ♀, 1 ♂).

PLECTOCRYPTUS, Thomson.

Thoms. O. E. v. 519; vi. 599; cf. ix. 850; (?) *Epiphobus*, Först. Verh. pr. Rheinl. 1868, p. 185.

Scrobes distinct; peristomium broad; flagellum of ♀ filiform; metathorax with longitudinal costae and oval spiracles. Scutellum somewhat convex. Abdomen usually black; petiole distinctly bicarinate; tibiae strongly spinulose.

The above characters will serve to distinguish this genus, originally comprising several species which were subsequently relegated to *Microcryptus* by Thomson, who confined it to *C. digitatus* and *P. scansor* on account of their black abdomen, broad peristomium, longer and stronger mandibles and shorter cheeks. From the preceding genus it may further be differentiated by the head which is more contracted in front of the antennae, the colour of the petiole, conformation of the scutellum and in not having the flagellum centrally incrassate.

Schmiedeknecht, in 1905, appears to have overlooked Thomson's restriction of this genus (Opusc. Ent. 850) and places in it species later transposed by the latter to *Microcryptus* and here treated of under that genus.

Table of Species.

(6). 1. Spiracles ovate; scutellum black; femora red.	
(5). 2. Head of ♂ pale-marked; ♀ macropterous.	
(4). 3. Flagellum pale-banded; anterior trochanters black.....	1. DIGITATUS, Gmel.
(3). 4. Flagellum not pale-banded; anterior trochanters white	2. LEUCOPSIS, Grav.
(2). 5. Head of ♂ immaculate; ♀ brachypterous.....	3. GRIESENS, Grav.
(1). 6. Spiracles linear; scutellum white; femora black.....	4. TINCTORIUS, Grav.

1. *digitatus*, Gmel.

Ichneumon digitatus, Gmel. S. N. i. 2688. *Phygadeuon digitatus*, Gr. I. E. ii. 642; Tasch. Zeits. Ges. Nat. 1865, p. 48; Capron, Entom. 1879, p. 14, ♀. *Plectocryptus digitatus*, Thoms. O. E. vi. 602 et xxi. 2382, ♂ ♀. *Cryptus bivinctus*, Gr. I. E. ii. 465; Tasch. Zeits. Ges. Nat. 1865, p. 78, ♂.

Head black, with mandibles except their apices, pale; ♂ with frontal orbits, labrum and palpi, dull white. Antennae centrally in both sexes, and sometimes the ♂ scape beneath, white; of ♀ filiform and half the length of the body. Thorax immaculate, with short grey pilosity; mesonotum shining, strongly and somewhat sparsely punctate; metathorax roughly punctate, with the areola indistinct and apically truncate; petiolar area nearly vertical and discreted, with the apophyses strong in ♀, wanting in ♂. Scutellum black. Abdomen strongly nitidulous and shortly pilose; of ♂ elongate, and of ♀ ovate, as broad as thorax, incrassate towards the anus, with the basal segment gradually dilated apically, the post-petiole bicarinate and sub-quadrate with distinct spiracles, and the seventh segment with a white membranous dot; terebra rather longer than half the abdomen. Legs stout and red, with coxae and trochanters black; ♂ with the hind tarsi and apical half of their tibiae infusate, and the second to fourth joints of the latter pure white. Wings a little clouded, of ♀ narrow

and of ♂ ample; radix stramineous, tegulae black; nervellus intercepted far below its centre. Length, 8-10 mm.

In size and conformation this species is similar to *Microcryptus curvus*, but the female's black abdomen, coxae and trochanters, and stouter red legs will distinguish it; it also bears a curious superficial resemblance in both sexes to *Cratichneumon annulator*, Fab.

Dr. Capron (Entom. 1880, p. 88), who found it at Shere in Surrey, was of opinion that *C. bivinctus* is not the true male of this species as indicated by Desvignes and Marshall, and adds that he has taken an insect "which is without doubt the true male." In his collection are one female and two males, of which the latter are distinct *inter se*; the larger certainly bears a strong resemblance to *P. digitatus*, but the metathoracic sculpture is very different and the two basal segments are scabriculous.

It is a common species in the northern and central districts of Europe, though only recorded in Britain certainly from about Hastings. I possess specimens captured by Piffard at Felden in Herts., and by Miss Chawner in the New Forest; and myself took a female in the Ipswich district of Suffolk in 1894. Bignell has captured it at Ivybridge, near Plymouth, in May, and Wilson Saunders, at Greenings in Surrey, in June.

2. *leucopsis*, Grav.

Ichneumon canaliculatus,¹ var. 1, Gr. I. E. i. 142, ♂; cf. Wesm. Mém. couron. Ac. Belg. 1859, p. 16. *Cryptus leucopsis*, Gr. I. E. ii. 467; Holmgr. Sv. Ak. Handl. 1854, p. 52; Tasch. Zeits. Ges. Nat. 1865, p. 77, ♂. *Cratocryptus ruficoxis*, Thoms. O. E. v. 525, ♂ ♀.

♂. Head obsoletely punctate and somewhat shining, black; mouth, face and cheeks white; clypeus discreted, with lateral foveae small. Antennae filiform, three-quarters of the length of the body, setiferous; black, with scape apically white-dotted beneath. Thorax black, sometimes with white dot before the radix; mesonotum discally punctate and deplanate, with notauli basally coalesced; metathorax coarsely scabrous, with basal transverse costa only distinct laterally, the apical strongly emarginate centrally; sides of the transverse and apically truncate areola sub-obsolete; petiolar area flat, elongate and distinctly discreted; metapleuræ pubescent, apophyses wanting, spiracles small and circular. Scutellum sub-convex, black and obsoletely punctate. Abdomen narrower than thorax, black, nitidulous and pubescent; segments two to six parallel-sided or gradually dilated, the second or first and second with rufescent incisures, the seventh usually obsoletely white-margined; basal segment laterally slightly curved, with strongly prominent spiracles, obsoletely canaliculate, uneven and finely scabrous. Legs red; the anterior with the coxae basally black and apically white, trochanters white, and apices of their femora sometimes flavescent; hind coxae, trochanters, tarsi, apices of tibiae and sometimes of the femora also, black; apices of hind trochanters either red or white. Wings not clouded; radix and tegulae white; nervellus antefurcal and obsoletely intercepted; fenestra entire. Length, 7-9 mm.

Gravenhorst says this little-known species is like *Cryptus stomaticus*, but that the abdomen is shorter and broader, and the areolet more quadrate.

¹ Little doubt can remain, I think, in spite of his reference of it to *Cryptus*, that Wesmæl's description of the TYPICAL *I. canaliculatus*, Grav., and more especially of its broad vertex and bicarinate second segment, indicates affinity with the sub-petiolar *Xoridini*, rather than with the present group.

Schmiedeknecht in 1890 assigned the present position to it, but in 1905, probably upon synonymizing it with *Cratocryptus ruficornis*, transferred it to the latter genus.

Thomson tells us the female has the hind femora apically nigrescent above, the scape brunneous beneath, all the coxae red and the basal segment not strongly convex. He compares this species with *C. anatorius*, than which it is a little larger and longer, with the wings sub-hyaline, with larger and less convergent areolet, the radial cell longer, femora thinner and the post-annellus twice longer than the scape.

This species occurs throughout north and central Europe; it is found in woods on *Prunus padus* in May and September, and has been bred from *Sesia sphagiformis* in Prussia. Bignell has kindly allowed me to examine the specimens he took at Longbridge and Bickleigh in June; and I possess males found at Shere, in Surrey, by Capron.

3. *grisescens*, Grav.

Cryptus grisescens, Gr. I. E. ii. 464; Ste. Ill. M. vii. 280; Tasch. Zeits. Ges. Nat. 1865, p. 78, ♂. *Plectocryptus scansor*, Thoms. O. E. xiv. 1532, ♀; xix. 2118, ♂; xxi. 2382.

Head, including palpi, black; of ♀ sub-quadrate anteriorly and not narrowed behind the eyes, cheeks sub-buccate, clypeus apically truncate and discreted from the epistoma. Antennae with a more or less broad central white band in both sexes; flagellum of ♀ stout, hardly attenuate apically and only slightly towards the base. Thorax immaculate, with grey pilosity; mesonotum of ♀ rugulose, of ♂ nearly smooth, with the notauli barely indicated; areola of ♀ obsolete, its costulae wanting; mesosternum smooth and very sparsely punctate, more strongly in the ♀. Scutellum black, of ♀ small. Abdomen black, narrower than thorax, dilated in ♂ towards the anus, of ♀ with fuscous pilosity; post-petiole distinctly carinate in ♂ only; second and third segments sometimes obsoletely rufescent apically in ♂, in ♀ (together with the first) entirely pale red; ♀ with the seventh apically white and the terebra shorter than half the abdomen. Legs of ♀ entirely red; ♂ with the coxae, trochanters, hind tarsi, apices of their tibiae, and sometimes also of their femora, black; third and fourth joints of the ♂ hind tarsi white. Wings of ♂ somewhat ample, hardly clouded; of ♀ abbreviated and reaching only to the centre of the petiole; radix testaceous, tegulae black; areolet of ♂ sub-quadrangular, of ♀ wanting. Length, 9 mm.

The ♂ is very similar to *P. digitalis*, but the immaculate frons and mouth, and more slender femora, render it distinct. The female would appear allied to Förster's genus *Catalytus*, though Schmiedeknecht, whose female may have been distinct from Thomson's, since he does not describe it, says in 1890 that this species is referable to a new genus of *Tryphoninae* and should not be included in the *Cryptinae* at all.

Kriechbaumer considered *C. grisescens* worthy of generic rank (Ent. Nachr. xix., p. 120), to which he accordingly raised it, under the name *Pseudocryptus*, though his female appears to differ from Thomson's *P. scansor*, here described.

Stephens says he found the male rarely near London, in June; and Capron took the same sex in Surrey. On the Continent it is apparently

confined to Sweden, though recorded by Gravenhorst from Austria and Prussia.

4. *tinctorius*, Grav.

Cryptus tinctorius, Gr. I. E. ii. 509; Tasch. Zeits. Ges. Nat. 1865, p. 98, ♂.

Head black, with the internal orbits and margin of labrum whitish; clypeus not discreted, anteriorly truncate, with deeply impressed basal foveae; epistoma not prominent. Antennae setaceous, longer than body, with the central flagellar joints white above. Thorax rarely with a white callosity beneath the radix; metathorax rugulose, its basal transverse costa wanting, the apical entire and strongly arcuate; areola distinct, its lateral costae continuous to base of the metathorax; petiolar area elongate and discreted; spiracles linear and distinct. Scutellum white. Abdomen not broader than the thorax, oblong and closely punctate; black, with segments two and three, apex of first, and margin of the fourth and of the fifth, lighter or darker red; the sixth and seventh white-margined; basal segment apically explanate, with weak tubercles; post-petiole deplanate, sub-aciculate and nearly quadrate. Legs somewhat elongate, black; anterior femora internally, tibiae and tarsi, red; hind ones with the incrassate femora, except apically and basal half of the tibiae, rufescent, and the coxae sometimes castaneous-marked. Wings clouded; areolet sub-coalesced above, nervelet obsolete; stigma pale, radix and tegulae dark. Length, 7-9 mm.

I am quite at a loss to conjecture the true position of this male, which may even be a *Platylabus* allied to *P. volubilis*, as indeed actually is the example representing this species in the British Museum, upon the strength of which, probably, Desvignes brought it forward as indigenous. If it appertain to the *Cryptinae*, the metathoracic sculpture proclaims it one of the *Phygadeuonides*, among which the elongate spiracles, the pale-banded antennae and truncate clypeus appear less incongruous in the present genus than in the *perspicillator* group of *Microcryptus*.

Confirmation of this species as British is greatly needed, since the above appears to be the foundation of our claim to it in our catalogues, and it is ignored by recent Continental authors.

TRICHOCRYPTUS, Thomson.

Thoms. O. E. vi. 609.

Body clothed throughout with silky pubescence. Head anteriorly triangular, vertex not broad, frons slightly excavate with obsolete scrobes; clypeus convex, not transverse, apically mutic; mandibles short and narrowed towards their apices, with the teeth sub-equal; cheeks elongate and compressed, genal costa inflexed. Antennae hardly reaching apex of thorax. Notauli nearly entire; metathoracic areae complete and very strongly delineated; spiracles circular. Abdomen sub-oval and black, basal segment dorsally carinate, the seventh nearly entirely white; ventral fold wanting. Legs red, tibiae mutic, claws somewhat elongate. Areolet large, with its sides nearly parallel; first-recurrent of lower wing far behind the cubital fork.

This genus comprises two species, one of which was recorded from Britain over a century ago by Fabricius, the other (which may be no

more than a constant variety of the first) is now recorded hence for the first time.

I do not find that *Dapanus*, Först., is synonymous herewith, and it certainly cannot be the same as *Sobas*, Först., as indicated by Ashmead (Proc. U.S. Museum, 1900, p. 29), nor can I find that Förster described *Trichocryptus* as there stated. The name *Sobas*, as noted by Schmiedeknecht (Ent. Nachr. 1890) is preoccupied in the Coleoptera.

Table of Species.

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|------|---|-----------------------------|
| (2). | 1. Areola elongate, emitting costulae before its centre | 1. CINCTORIUS, <i>Fab.</i> |
| (1). | 2. Areola transverse, emitting costulae from its centre | 2. AQUATICUS, <i>Thoms.</i> |

1. cinctorius, *Fab.*

Ichneumon cinctorius, *Fab.* E. S. ii. 149 (*nec* Desv.), ♀. *Cryptus cinctorius*, *Fab.* Piez. 79; Gr. I. E. ii. 480; Ste. Ill. M. vii. 281, ♀. *C. parvulus*, Gr. I. E. ii. 459; *Tasch. Zeits. Ges. Nat.* 1865, p. 74, excl. ♀. *Phygadeuon cinctorius*, *Tasch. lib. cit.*, p. 38, ♂ ♀. *Trichocryptus cinctorius*, *Thoms. O. E.* vi. 610; cf. *Brisch. Schr. Nat. Ges. Danz.* 1882, p. 340.

Head narrower than thorax, black; temples not narrowed behind the eyes, frons finely reticulate, face pilose; labrum apically free, palpi rufescent. Antennae reaching slightly beyond apex of the thorax, filiform, with the scape excised to its centre; of ♀ somewhat incrassate towards the obtuse apex, and the flagellum basally attenuate, with the first joint distinctly curved externally, and the third to the tenth rufescent; of ♂ pilose, setaceous and entirely black. Thorax oblong, a little compressed, somewhat dull and immaculate; mesonotum very finely punctate, with notauli distinct and entire; mesosternal sulci nearly entire, epimera punctate; metathorax not transverse, finely rugulose, with long white pilosity, complete upper areae, and large though apically obtuse apophyses; areola rectangular or elongate, emitting the strong costulae from before its centre; petiolar area entire and sub-vertical. Scutellum a little convex, densely pilose and obsoletely punctate; of ♂ black and of ♀ entirely, or broadly at the apex, white. Abdomen sub-convex, pilose and shining; of ♀ oblong-ovate, slightly broader than the thorax, of ♂ sub-lanceolate; black, with the seventh dorsal segment, and apices of all the ventral, white, the three basal rarely apically badious; post-petiole slightly convex and laterally margined, of ♀ entirely glabrous and as long as apically broad, with inconspicuous spiracles, of ♂ elongate and gradually dilated towards the sub-strigose apex, bicarinate throughout, with prominent spiracles; terebra nearly half the length of the abdomen, straight, with the spicula red. Legs red and somewhat elongate; the fuscous tarsi setiferous beneath, claws strongly curved and simple; ♂ with apices of the hind femora and tibiae black, and joints three and four of all the tarsi basally white. Wings slightly infumate, with the stigma not broad, and the lower external angle of the discoidal cell rectangular, its fenestra entire; radix and tegulae not pale; nervellus strongly sinuate and intercepting the recurrent nervure slightly above its centre. Length, 5-9 mm.

In Britain the males are much rarer than the females, and the majority of those I have seen have the hind femora and tibiae entirely red and the

hind coxae—like the female referred to by Taschenberg—black, with the basal joint of their trochanters concolorous.

This species occurs throughout northern and central Europe, and is the *Ichneumon Scirpi* of Fourcroy, of which Geoffroy wrote in 1764 “reperi hunc Ichneumonem copiosissime, versus finem ætatis, in culmis Scirpi; forsàn ova deponit in corpus ejusdam insecti aquatici”; but I cannot find that it has ever been bred, and we now know no more of it than to confirm the statement that it appears to occur solely upon aquatic plants, and is usually taken by coleopterists while sweeping in such situations, which would suggest an association with some such insect as *Hydrocampa nymphaea*. By no means rare in marshy places; found somewhat uncommonly near London, also in Devonshire, the New Forest, etc., in June (Stephens); Acle, in the Norfolk broads (Bridgman); both sexes from Surbiton (*in coll.* Marshall); Appledore, in Kent, at the end of April (Beaumont); Essex (Harwood). I possess specimens taken between the middle of July and the end of September at Oulton Broad, while fishing for water beetles by Bedwell, at Martham Broad on aquatic plants by Janson, at Sutton Coldfield by Willoughby Ellis; and at Barnby Broad, in Suffolk, I have fished it up from *below* the surface of the water and taken it upon the flowers of *Angelica sylvestris*.

2. *aquaticus*, *Thoms.*

Cryptus cinctorius, Gr. I. E. ii. 481 (indiv. max. antennis totis nigris), ♀. *Trichocryptus aquaticus*, Thoms. O. E. vi. 611, ♂ ♀.

Black, somewhat shining; metathoracic areola transverse; legs red; ♀ with antennae black and scutellum white; ♂ with hind coxae and trochanters black. Length, 8–10 mm.

So like the preceding as to require no detailed description; therefrom it may be known by its usually larger size, transverse areola, which is often apically arcuate and always emits the costulae from its centre, the much more strongly elevated centre of the basal segment, and the sub-rugosely punctate metapleuræ and sides of the post-petiole; the flagellum of the female, moreover, is not basally rufescent.

Thomson also indicated the black hind coxae as a specific distinction, but, as I have pointed out under *T. cinctorius*, this cannot be considered constant since the areola of my males is not transverse and the basal segment not elevated centrally, they were, moreover, taken in company with typical females of the first species.

A single female of this species, which has not previously been recorded from Britain, in my collection, was captured by Mr. W. H. Tuck, M.A., in Finborough Park, in Suffolk, on the 24th September, 1900. Gravenhorst found it at Cudova, in Silesia, on umbels, in August; and Thomson describes it from Sweden. There is also a female, mixed with *T. cinctorius*, in the British Museum; it is, perhaps, not rare in Britain.

CRATOCRYPTUS, *Thomson.*

Thoms. O. E. v. 521; (?) *Leptodemas*, Först. Verh. pr. Rheinl. 1868, p. 182.

Body black and somewhat large. Head nearly cubical; cheeks broad, eyes glabrous, mandibular teeth unequal; clypeus mutic, apically shining

and sub-glabrous. Antennae inserted below the centre of the eyes, scape excised; flagellum of the ♀ filiform and sub-attenuate basally, white-banded, of ♂ sub-setaceous and not short. Pronotal epomia obsolete, notauli short; mesosternal sulci usually entire; metathoracic spiracles small and circular, areola often distinct. Scutellum deplanate. Abdomen black, with no pale bands; petiole gradually dilated to the apex, sub-carinate, with spiracles slightly behind the centre; second segment very closely punctate dorsally, dull and sometimes undeterminately pale castaneous; eighth of the ♀ large; terebra usually elongate and slightly reflexed. Legs stout, mainly red; tibiae mutic. Wings with the stigma not broad, basal nervure sub-arcuate; the exterior fenestra entire and the lower external angle of the discoidal cell rectangular; nervellus slightly ante-furcal and intercepted below its centre.

I do not follow Ashmead in considering this genus identical with *Chaeretymma*, Först., though some of its species, e.g., *C. subpetiolatus*, may be referable to the latter; since the areola is often more or less determinate, the metathoracic spiracles are always circular and the terebra is rarely longer than the abdomen. It is, however, certainly the *Chaeretymma* of Schmiedeknecht's "Die Gattungen und Arten der Cryptinen," 1890.

Table of Species.

(4).	1.	Median mesosternal sulcus with a basal cristula.	
(3).	2.	Frons nitidulous; mesosternum somewhat smooth.....	1. FURCATOR, Grav.
(2).	3.	Frons somewhat dull; mesosternum sub-rugulose.....	2. STOMATICUS, Grav.
(1).	4.	Median mesosternal sulcus with a basal transverse line.	
(6).	5.	Areolet convergent above; anus very distinctly white.....	3. ANATORIUS, Grav.
(5).	6.	Areolet sub-parallel-sided; anus not or indistinctly white.	
(8).	7.	Head sub-triangular; cheeks not buccate; terebra longer than abdomen...	4. SUBPETIOLATUS, Grav.
(7).	8.	Head normal; cheeks buccate; terebra shorter than abdomen.	
(10).	9.	Mesonotum sparsely punctate; femora red	5. PARVULUS, Grav.
(9).	10.	Mesonotum closely punctate; femora black	6. TARSATUS, Bridg.

1. furcator, Grav.

Cryptus furcator, Gr. I. E. ii. 462; Ste. Ill. M. vii. 279; Tasch. Zeits. Ges. Nat. 1865, p. 75, ♀. *Cratocryptus furcator*, Thoms. O. E. v. 523, ♂ ♀; cf. xxi. 2382 et Kriech. Ent. Nachr. 1891, p. 227.

Head black, with frons nitidulous; ♂ with the genal and the juxta-antennal orbits, clypeus, mandibles and palpi white. Antennae of ♀ with the four central joints above, ♂ with the scape beneath, white. Thorax immaculate; mesosternum not rugose, its central sulcus with a bidentate cristula before the intermediate coxae. Scutellum black. Abdomen as broad as the thorax, black; post petiole sub-quadrate, with distinct carinae; terebra as long as the abdomen. Legs red; hind tarsi and more or less of their tibiae infuscate; ♂ with coxae and trochanters black.

Wings hardly clouded; radix testaceous or white, tegulae white or white-marked; areolet somewhat convergent above. Length, 10 mm.

The male may have the tegulae and cheeks black or white, and the anterior coxae are sometimes pale beneath. Gravenhorst mentions females with a dull red callosity beneath the radix; with the scape badius beneath; with the basal segment apically castaneous, together with the seventh dorsally flavidous, and the terebra slightly shorter.

It differs from *C. stomaticus* in the comparatively smooth mesonotum, and from *C. anatorius* in the broader areolet, longer terebra and shorter, thicker petiole of the female. Brischke says Thomson's description does not agree with that of Taschenberg, but I do not consider the discrepancies sufficient to warrant such a conclusion. Kriechbaumer thought the areolet in this species and *C. sternocerus*, Thoms., too variable in shape to furnish a reliable specific distinction which, he says, is to be found in the coxal coloration, and further that in the former the frons is more nitidulous and centrally foveate, while in the latter it is more excavate throughout.

All British records appear to be based upon Stephens' mention of this species as occurring about London in June, and confirmation of it as indigenous was certainly badly needed. This is furnished by the presence of a single ♂, kindly given to me by Mr. A. Piffard, who captured it at Felden, in Hertfordshire. On the Continent it is found throughout the northern and central districts, but it does not appear to have yet been bred.

2. *stomaticus*, Grav.

Cryptus stomaticus, Gr. I. E. ii. 466; Tasch. Zeits. Ges. Nat. 1865, p. 77, ♂. *Cratocryptus sternocerus*, Thoms. O. E. v. 523, ♂ ♀; cf. xxi. 2382. *Chaeretymma bipunctata*, Strobl. Mitt. Naturw. Ver. Steierm. 1900, p. 194, ♂.

Head black, with frons somewhat dull; ♂ with facial orbits broadly, and the mouth, stramineous, but with the base and apex of the mandibles and generally a clypeal mark, black. Antennae of ♂ with scape beneath, and ♀ with the central flagellar joints, white. Thorax black; of ♂ with pronotum usually white and the mesosternum laterally rugose, its central sulcus in both sexes with a bidentate cristula before the intermediate coxae. Scutellum black. Abdomen also black; of ♂ narrower than the thorax, with segments two to six parallel-sided, the post-petiole carinate and elongate, the apical margin of the three basal segments sometimes rufescent, of the fourth to the sixth glaucous-white, and of the seventh membranous; ♀ with the terebra as long as the abdomen. Legs red and not stout; coxae and trochanters black, the anterior of the ♂ white-marked beneath; hind tarsi, apices of their tibiae, and of the ♀ hind femora, black. Wings hardly clouded; radix and tegulae pale stramineous, latter black in ♂; areolet convergent above. Length, 10 mm.

This species is very similar to *C. furcator* in conformation and distribution, but both sexes have the basal segment less elevated and less arcuate, and the areolet rather larger; the coxae, trochanters and apex of the hind femora of the female are black, and their tibiae red, with only the apex black; the face of the male is less profusely pale-marked, its tegulae are always black and, in particular, the sides of its mesosternum are rugose.

Kriechbaumer differentiated this species from *C. sternocerus* upon the divergence in colour of the coxae and tegulae.

Bridgman records this species, which is probably not uncommon though overlooked, from Eaton and Earham, near Norwich, in June; and Bignell found it at Longbridge at the end of June and at Bickleigh early in July. I possess specimens, taken on the flowers of *Heracleum sphondylium*, in Bentley Woods and the Bramford marshes, near Ipswich; and others taken by Adams in the New Forest, by Piffard, at Felden, in Herts., and by Capron, at Shere, in Surrey; their dates only range from the 6th to 17th July. Stanley Edwards has captured the female, at Lynton, in Devon.

3. *anatorius*, Grav.

Cryptus bilineatus, Gr. I. E. ii. 468; Tasch. Zeits. Ges. Nat. 1865, p. 75, ♂. *C. anatorius*, Gr. I. E. ii. 460; Ste. Ill. M. vii. 279; Tasch. Zeits. Ges. Nat. 1865, p. 75, ♀. *Cratocryptus anatorius*, Thoms. O. E. v. 524, ♂ ♀.

Head black, with cheeks buccate; of ♂ with the mandibles, palpi and the facial orbits nearly triangularly, white. Antennae with post-annellus a little longer than the scape; of ♀ filiform, with the central joints clear white and the following sometimes ferruginous beneath. Thorax immaculate, with the mesonotum shining and not closely punctate; mesosternal median sulcus terminated posteriorly by a sub-angulated transverse line; the costulae emitted before the centre of the areola. Scutellum black. Abdomen of ♀ oblong-ovate, with the post-petiole sub-carinate, nearly quadrate and gradually explanate apically; the sixth and seventh segments of the ♀ with a whitish membrane extending nearly to their centre, the seventh of ♂ with its apical margin centrally pale; fifth of ♀ usually with the ventral valvula prominent and the terebra slightly arcuate, nearly as long as the abdomen, its spicula red and sheaths black. Legs red; coxae and trochanters, except the posterior ones of the ♀, hind tarsi, the apices of their tibiae and of their femora, infuscate. Wings somewhat clouded, with the radix piceous or stramineous; tegulae of ♀ black, of ♂ white; areolet strongly convergent above. Length, 9 mm.

The more strongly convergent areolet, buccate cheeks, position of the costulae and the coloration of the male's head and of the female's legs will serve to discriminate this species, of which Gravenhorst mentions female varieties with the front femora externally black and the hind tibiae entirely infuscate.

There seems to be no room to doubt that Thomson's male of *C. anatorius* is *C. bilineatus*, since it agrees in every particular with Gravenhorst's description, and the central segments are not always basally badious. Taschenberg adds that the metathorax is finely rugulose, with the basal transverse costa wanting, the areola laterally indicated, hexagonal and apically incomplete; the pleural longitudinal costae strong, apophyses distinct, with small and circular spiracles; the post-petiole is parallel-sided and nearly as long as the laterally curved and sub-explanate petiole; the two basal segments are finely coriaceous.

This is probably quite a common species in Britain. It has been recorded from Mousehold, near Norwich, in August, Horrabridge early in October (which points to its hibernating in the perfect state), from Maldon, in Essex; and by Stephens, who says it used to be not uncommon in June near London and in Shropshire. Bradley has taken it at Sutton, near

Birmingham, in August; Thornley in Treswell Wood, towards the end of April (probably after hibernation); and Capron both sexes at Shere, in Surrey. I have captured the female in Lyndhurst in August, and Chitty at Loch Awe in May.

4. *subpetiolatus*, Grav.

Cryptus subpetiolatus, Gr. I. E. i. Suppl. 699; Ste. Ill. M. vii. 280; Tasch. Zeits. Ges. Nat. 1865, p. 73, ♀. *Cratocryptus subpetiolatus*, Thoms. O. E. v. 525, ♀.

Head anteriorly sub-triangular, narrowed behind the eyes; cheeks not buccate; palpi fulvescent and the facial orbits white. Antennae slender, filiform; dark, with two of the central joints white above; post-annellus nearly thrice longer than the scape. Thorax immaculate, with the mesonotum shining and not closely punctate; mesosternal median sulcus terminated posteriorly by a sub-angulated transverse line; coxal area indeterminate, spiracles contiguous with pleural costae. Scutellum black. Abdomen elongate, black and dull; post-petiole with approximate dorsal carinae; second segment elongate, the third and fourth sub-quadrate, with the following transverse; terebra longer than the whole insect, with the spicula red and the sheaths pilose. Legs slender and red; hind ones with the coxae and trochanters sometimes centrally infuscate, their tibiae externally and tarsi nigrescent; femora especially slender. Wings slightly clouded; radix and tegulae white; areolet broad, with the sides parallel, emitting recurrent nervure from its centre. Length, 6 mm.

This species will easily be distinguished by the structure of its head, less basally constricted petiole, the position of the metapleural spiracles, and the length of the post-annellus and of the terebra, from the remainder of this genus. The elongate form and ovipositor and its dull surface somewhat lend it the facies of a small *Ephialtes*.

The specimen from which it was originally described was taken by Hope, at Netley, in Shropshire, though it has subsequently been found to occur throughout the northern half of Europe. Stephens records it rarely from near London, in June. There is one specimen in Dr. Capron's collection, probably from Shere, and another in Marshall's (in Brit. Mus.) from Cornworthy, Devon, in 1889. On June 24th, 1896, I was so fortunate as to capture an example flying to the burrows of some *Crabro*, most likely *C. quadrimaculatus*, in a rotten post, at Bentley, in Suffolk. It has never yet been bred, and this is the first hint we have regarding the nature of its hosts, for probing whose burrows its elongate terebra appears admirably adapted.

5. *parvulus*, Grav.

Cryptus parvulus, Gr. I. E. ii. 459; Ste. Ill. M. vii. 279; Tasch. Zeits. Ges. Nat. 1865, p. 74, excl. ♂. *C. erythropus*, Gr. I. E. ii. 469; Tasch. Zeits. Ges. Nat. 1865, p. 75. ♂. *Cratocryptus parvulus*, Thoms. O. E. v. 526. ♂ ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1882, p. 339.

Head black, with cheeks buccate; ♀ with frontal orbits sometimes, ♂ with more or less of the mandibles and of the clypeus, white. Antennae black; of ♀ with seven basal joints often ferruginous beneath, and the four following white above. Thorax immaculate; mesonotum shining and not closely punctate; median mesosternal sulcus terminated posteriorly by a sub-angulated transverse line; apophyses small, but distinct. Scutellum

black. Abdomen black, with the apical margins of the two basal segments often castaneous; of ♀ oblong-ovate, of ♂ narrower than the thorax and fusiform; first segment of ♀ gradually strongly dilated towards the apex, and the seventh with a white membrane; terebra straight and distinctly shorter than the abdomen. Legs red; all the coxae and trochanters of the ♂, but only the front coxae occasionally of the ♀, black; all the femora red and somewhat stout. Wings a little clouded; radix dull white; tegulae of ♂ white, of ♀ black; areolet broad and parallel-sided, emitting the recurrent nervure from its centre. Length, 6 mm.

The male sometimes has the scape beneath, and the trochanters, white; it is very like that of *C. stomaticus*, but the areolet is longer and exactly quadrate, besides the mesopectoral conformation.

Found in June, near London (Stephens); Brundall, Heigham osier carr, and taken at Lynn by Mr. Atmore (Bridgman); Acomb Wood, near York, and bred from *Emphytus cinctus* (Wilson); Essex (Harwood); Wellington College, Berkshire, in April (Hamm). I have recorded the male of this species from Barnby Broad, in Suffolk (E.M.M. 1899, p. 209), under the name *Cryptus erythropus*, querying at that time the certainly incorrect synonymy with *Cryptus lugubris*, Grav.; it was taken upon the flowers of *Angelica sylvestris* in a very marshy spot towards the end of August, and about the same time I swept a second male in a marshy meadow at Henstead, in Suffolk. I have not again met with it, which circumstances, added to Bridgman's localities, lead me to think it is a fen insect. Dalglish has given me the female from Bigmopton, in Scotland, taken early in May; Piffard, from Felden, in Herts.; and Tuck a male from Benacre Broad, on the Suffolk coast.

6. *tarsatus*, Bridg.

Phygadeuon tarsatus, Bridg. Trans. Ent. Soc. 1881, p. 150, pl. viii., ff. 9-9a, ♂ ♀.

Head with clypeus distinctly discreted and apically truncate; face somewhat coarsely punctate in ♀, more finely in ♂; frons centrally impressed, strongly and somewhat closely punctate with the interstices reticulate; ♂ with clypeus and the internal orbits flavous. Antennae of ♀ normal, centrally white-banded; basal flagellar joint twice longer than broad and longer than the second, the sixth quadrate. Thorax immaculate; mesonotum closely and finely punctate, with the notauli more distinct in ♂; metathorax finely rugose-punctate, with the apical transverse costa laterally distinct and the sides of the ill-defined areola weakly indicated; spiracles ovate. Scutellum black, shining and somewhat sparsely punctate. Abdomen smooth, shining and immaculate; of ♀ ovate, with the basal segment gradually dilated throughout and the second transverse, of ♂ with basal segment slender and hardly apically broader than the petiole, its spiracles minute; the three following segments elongate with the fifth transverse; terebra three-quarters of the length of the abdomen. Legs somewhat slender, black; the hind tarsi piceous and centrally white; apices of the front femora and, in ♀, of their tibiae and tarsi, red; ♂ with anterior tibiae and tarsi fulvous, with base of the hind tibiae and femora red. Wings with tegulae dull stramineous. Length, 6-9 mm.

Bridgman has included this species under the present genus in his

collection at the Norwich Museum, and it appears to agree very well therewith, excepting in the ovate spiracles. Its relation to *C. stomaticus* seems to be very close, though the areolet is parallel-sided (as figured by him) and the legs darker. It does not appear to have been recognized, nor even mentioned, upon the Continent.

Cameron took the only known specimens, a male and three females, near Lamlash, in Arran, towards the middle of September.

DEMOPHELES, Förster.

Först. Verh. pr. Rheinfl. 1868, p. 186; *Mecocryptus*, Thoms. O. E. vi. (1874), 607.

Head nearly cubical, genal costa not inflexed; clypeus strongly discreted, its apex broadly rounded, with a central triangular excision which is obsolete in the ♂; mandibles elongate, with acute teeth, of which the upper is the longer. Antennae short; post-annellus a little shorter than the slightly excised scape. Abdomen smooth and shining, black. Tibiae not or hardly spinulose.

This genus is said to agree to a certain extent with *Cubocephalus*, though differing materially in the conformation of the mandibular teeth, the less cubical head, the not or scarcely inflexed genal costa, triangularly excised clypeus, more nitidulous and apically compressed abdomen, slightly longer and apically sub-attenuate antennae, straight and shorter terebra, obvious frontal puncturation and pale orbital line. Thomson himself thought his genus probably synonymous with *Demopheles*.

1. *caliginosus*, Grav.

Phygadeuon caliginosus, Gr. I. E. ii. 645, excell. ♂ et var. ♀. *P. corruptor*, Tasch. Zeits. Ges. Nat. 1865, p. 49, ♀. *Mecocryptus caliginosus*, Thoms. O. E. vi. 607, ♂ ♀.

Elongate, black, smooth and shining. Head nearly cubical, evenly, coarsely and somewhat closely punctate; black, with frontal orbits white and mouth ferrugineous; cheeks sub-buccate, smooth and shining; epistoma prominent and ♂ with mouth and face also white. Antennae of ♂ black, of ♀ red-brown, filiform and not stout, though slightly incrassate beyond the centre; scape of ♀ red, of ♂ white, beneath. Thorax of ♀ immaculate, of ♂ with callosities before and beneath the radix, white; mesonotum sub-glabrous and nitidulous, obsoletely punctate, with the notauli short; mesosternal sulcus deeply impressed and reaching beyond the centre; metathorax rugose, with the areola narrow and sub-obsolete; petiolar area distinctly impressed centrally; apophyses obtuse, spiracles circular. Scutellum black and deplanate. Abdomen elongate-lanceolate and apically sub-compressed, glabrous and nitidulous, with segments six and seven white-margined and the two basal generally apically castaneous; basal segment slightly curved laterally, dorsally deplanate and aciculate nearly to the hardly explanate apex, carinae wanting; second not punctate, with spiracles contiguous with the lateral margin; terebra straight, one quarter the length of the abdomen, and shorter than the metatarsus. Legs somewhat stout, red, with the whole of the hind coxae black; hind tarsi,

with sometimes the base and apex of their tibiae, infusate; ♂ with anterior coxae and trochanters white. Wings normal, hardly clouded; radix and tegulae white. Length, 6-8 mm.

Taschenberg says that this species, which is the *Phygadeuon corruptor* of Marshall's 1872 Catalogue, is very like *Cubocephalus brevicornis*, but that the second segment is not, as in that species, punctate; the inner orbits are white and the antennae less incrassate; the conformation of the wings is similar to those of *C. nigriventris*.

It occurs in June throughout northern and central Europe, but I know of no specific British records, and it was not recognized as indigenous till 1872. There are three males and two females in Dr. Capron's collection, probably captured in Surrey.

CUBOCEPHALUS, Ratzeburg.

Ratz. Ichn. d. Forst. ii. (1848), 121; *Pammachus*, Först. Verh. pr. Rheinl. 1868, p. 185. *Stenocryptus*, Thoms. O. E. vi. (1874), 603.

Head cubical, cheeks very broad and temples buccate behind the small eyes; mandibles somewhat elongate with the teeth of equal length; clypeus strongly discreted and apically mutic. Antennae of ♀ not longer than thorax, incrassate; post-annellus shorter than the slightly excised scape. Abdomen oblong, sub-parallel-sided, of ♀ apically sub-compressed; basal segment with obsolete carinae, second densely and very finely alutaceous, longer than the third. Legs stout, calcaria not reaching the centre of the metatarsi; tibiae mutic. Wings with the areolet pentagonal.

Thomson says that his *Stenocryptus* agrees most closely with *Cratocryptus*, but that the head is more cubical with much more buccate cheeks; the antennae are shorter, with the scape as long as the post-annellus and less deeply excised apically; the abdomen, also, is smaller and nearly glabrous. From *Mecocryptus* (*Demopheles*), he says it differs in the apically entire clypeus and larger mandibular teeth, though similar in facies and the form of the head.

The position of this genus has been a doubtful point ever since its erection by Ratzeburg, who says the female abdomen resembles those of both *Campoplex* and *Xorides*; to the latter it appears related in its posteriorly buccate head and short legs, and attention has also been drawn to the similarity of its antennae to those of *Alomyia*. The male, however, bears distinctly Cryptid facies, and both sexes have the pentagonal areolet: I do not find the position of the petiolar spiracles described. Marshall, in 1872, follows Taschenberg in retaining it in *Phygadeuon*, and Thomson treats of his sub-genus in the same position. *Cubocephalus* is not placed by Förster, though its synonymy with *Cyllceria*, Schiödt, Rev. Zool. 1837, p. 140 (given by Ashmead as the same as *Lampronota*, Hal.) is queried. Ashmead sinks *Stenocryptus* as a synonym of *Pammachus* with no type (the type of the former is *nigriventris*, Thoms. O. E. 521) under the *Cryptinae*, and gives *Cubocephalus* as quite distinct, also with no type (the type is *fortipes*, Grav., cf. Ratz. loc. cit.), under the *Xoridini*. The present appears to be the most convenient tentative position for this genus, which Schmiedeknecht, retaining Thomson's name, thinks may also include *Ecporthetor*, Först.

Table of Species.

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|------|----|--|--------------------------------|
| (6). | 1. | Frons distinctly punctate ; terebra reflexed. | |
| (3). | 2. | Head buccate behind eyes ; frons sparsely punctate..... | 1. FORTIPES, <i>Grav.</i> |
| (2). | 3. | Head cubical ; frons closely punctate. | |
| (5). | 4. | Basal segment laterally curved ; areola entire ; orbits pale | 2. NIGRIVENTRIS, <i>Thoms.</i> |
| (4). | 5. | Basal segment laterally straight ; areola obsolete ; orbits immaculate | 3. BREVICORNIS, <i>Tasch.</i> |
| (1). | 6. | Frons sub-glabrous ; terebra straight | 4. OVIVENTRIS, <i>Grav.</i> |

*C. fortipes.**C. fortipes.***1. fortipes, Grav.**

Cryptus fortipes, Gr. I. E. ii. 473. *Cubocephalus fortipes*, Ratz. Ichn. d. Forst. ii. 122. *Phygadeuon fortipes*, Tash. Zeits. Ges. Nat. 1865, p. 52, ♀. *Stenocryptus fortipes*, Thoms. O. E. vi. 605, ♂ ♀.

Black, somewhat shining and sub-glabrous. Head globose, sub-buccate with the vertex broad, sub-quadrate and dilated behind the eyes ; palpi testaceous, mandibles of ♀ mainly red ; frontal orbits white-marked, ♂ with face or the inner orbits, the cheeks and the mouth white ; frons somewhat sparsely and strongly punctate. Antennae of ♀ not quite half the length of the body, piceous or ferrugineous, centrally incrassate and white-banded, apically obtuse, infusate, with basal flagellar joints dull ferrugineous ; of ♂ black and setaceous, with the scape white beneath. Thorax cylindrical and immaculate ; metathorax sub-rugose and somewhat dull, with the petiolar area discreted ; the spiracular indicated in ♀, distinct and inflexed in ♂, with the spiracles circular-oval but small ; areola laterally entire but confluent with the basal area ; apophyses wanting. Scutellum black. Abdomen hardly narrower than the thorax, of ♂ deplanate and less shining basally ; first segment deplanate and confluent punctate, gradually dilated in a straight line to the apex, with the post-petiole apically castaneous-marked and in ♂ bicarinate ; the second quadrate with marginal mark and sometimes another on the disc castaneous, in ♂ basally bicarinate ; the next two transverse and parallel-sided ; the remainder in the ♀ narrowly clear-white margined ; terebra hardly shorter than the abdomen, reflexed, with the valvulae black. Legs stout, and in ♀ entirely dark red or with the anterior infusate ; ♂ with coxae black, the front ones, with all the trochanters, white beneath, and apices of the hind femora and tibiae, with all the tarsi, infusate. Wings slightly clouded, radix testaceous ; tegulae infusate, of ♂ white. Length, 8–10 mm.

The ♂ sometimes has the hind femora infusate, their tarsi brown and two white callosities before the radix.

This species is very similar in conformation, colour and puncturation to *C. nigriventris*, but is larger with the head dilated behind the eyes, vertex broader, frons more strongly and sparsely punctate ; the female has the

flagellum centrally pale, with the legs stouter, and the male the thoracic spiracles nearly oval and the second segment often basally bicarinate.

The distribution of this species is said to extend throughout the northern and central districts of Europe. Ratzeburg bred the females in Germany, with *Tryphon* (*Mesoleius*) *niger*, Grav., from *Allantus cingulatus*, and the males from the bark of trees. It would appear to be of rare occurrence in Britain. I have seen a female taken by Bignell, at Horrabridge, in Devonshire, in mid-September, and A. J. Chitty has given me a male, which he captured, in the New Forest, in June, 1893.

2. *nigriventris*, Thoms.

Phygadeuon caliginosus, Gr. I. E. ii. 645, ♂ et var. ♀; Tasch. Zeits. Ges. Nat. 1865, p. 22, ♂ ♀. *Stenocryptus nigriventris*, Thoms. O. E. vi. 604, ♂ ♀.

Elongate, black, sub-glabrous and somewhat shining. Head large, nitidulous and not narrower than the thorax, with the vertex broad and not declived, temples tumidulous; frons deplanate, with usually a considerable orbital dot, and the scrobes not large; epistoma not prominent, clypeus transverse, mandibles twice longer than broad; ♂ with palpi testaceous, face and mouth, with the buccate cheeks, white. Antennae of ♀ filiform, black, with no central pale band, less than twice longer than the head; of ♂ not reaching beyond the thorax, somewhat attenuate, with the basal joints rufescent, and the scape usually white, beneath. Thorax elongate, of ♂ with two white dots near the radix; pronotum short, with the epomiae nearly wanting; mesonotum finely punctulate; mesosternum shining and sparsely punctate, with the epicnemial nearly entire, and the lateral sulci well-defined, though not reaching beyond the centre; metathorax not transverse, areae of the ♂ complete, of the ♀ with petiolar area distinct, areola outlined and the lateral costae indistinct; spiracles small and circular. Scutellum black. Abdomen oblong, black and nearly glabrous; basal segment extending beyond hind coxae, gradually dilated throughout and slightly curved, of ♀ with no dorsal carinae; post-petiole densely and very finely alutaceous or aciculate, and dull; the second hardly transverse, dull and sub-punctate, with the remainder nitidulous; terebra reflexed and half the length of the abdomen. Legs of the ♀ stout and entirely red; ♂ with the anterior coxae basally and the hind ones entirely, apices of the hind femora and of their tibiae, black; hind tarsi infusate and centrally rufescent. Wings hardly clouded, with the stigma somewhat large; tegulae black, of ♂ white; radix flavescent, areolet pentagonal; nervellus intercepted far below its centre. Length, 6–8 mm.

Gravenhorst's female is quite distinct from that of the present species, which is the *Phygadeuon caliginosus* of Marshall's Catalogue, in which the typical ♂ is misprinted "♀."

Bridgman has recorded this species, whose range extends throughout north and central Europe, from Sparham, in Norfolk; and Bignell from Stonehouse, in Devon, in August. In July, 1904, Donisthorpe gave me a female of this species, which he had "dug at Market Bosworth, Leicestershire, from a burrow of *Tetropium castaneum*, in a spruce tree"; there was, however, no direct evidence of this species' parasitism upon the longicorn coleopteron (*cf.* E.M.M. 1906, p. 41). Dr. Capron has also

taken it at Shere, in Surrey; and Chitty at Huntingfield, in Kent, in August.

3. *brevicornis*, *Tasch.*

Phygadeuon oviventris, Gr. I. E. ii. 648, excl. ♂. *P. brevicornis*, *Tasch. Zeits. Ges. Nat.* 1865, p. 48, ♀.

Head stout and black; the discreted clypeus, face and vertex very finely and closely punctate with isolated larger punctures; mouth flavous. Antennae filiform, red-brown, stout, apically obtuse and rather shorter than half the body; basal half of flagellum with short, moniliform joints of equal breadth; scape ferrugineous below. Thorax immaculate; metathorax dull and finely alutaceous; only the nitidulous apical transverse costa and short lateral ones, beyond the circular spiracles, present. Scutellum black. Abdomen oblong-ovate, as broad as the thorax, and basally closely punctate; black, with segments five to seven white-margined; basal segment dorsally deplanate, laterally straight and gradually explanate apically; terebra slightly reflexed and half the length of the abdomen. Legs stout, entirely red; tibiae sericeous. Wings somewhat ample and hardly clouded; radix white, tegulae fulvous. Length, 7 mm.

Brischke has placed this female, of which Thomson makes no mention, in the present genus, where it is closely allied to *C. nigriventris* in its stout head and antennae, short flagellum, circular spiracles, the conformation of the basal segment, and the stout legs. Schmiedeknecht, in 1905, queries the synonymy of *P. brevicornis* therewith, while admitting Gravenhorst's male, *P. oviventris*, to have been originally correctly associated with its female. From *C. nigriventris*, however, the present species may be known by its broader abdomen, which has the apical segments white-margined, and the metathoracic costae are more obsolete.

This species was first noticed in Britain by Marshall in 1872; but I have heard of no records. On the Continent it is found, in early September, on the flowers of *Angelica sylvestris*. There is a male, which may belong to this species, from Shere, in Capron's collection.

4. *oviventris*, *Grav.*

Phygadeuon oviventris, Gr. I. E. ii. 648, excl. ♀; *Tasch. Zeits. Ges. Nat.* 1865, p. 49, ♂ ♀. *Stenocryptus oviventris*, *Thoms. O. E.* vi. 606, ♂ ♀.

Head black; frons sub-glabrous, laterally white-marked; ♀ with inner orbits, ♂ with face, clypeus and mouth, stramineous and apices of mandibles ferrugineous. Antennae of ♂ sub-setaceous, nearly as long as the body, with the scape stramineous beneath; of ♀ stout and sub-incrassate towards their apices, with white central band. Thorax immaculate; metathoracic areae very distinct in ♂, areola alone indicated in ♀; petiolar area discreted, spiracles circular. Scutellum black. Abdomen as broad as the thorax, ovate, deplanate, shining, black; petiole linear in ♂, gradually explanate in ♀; post-petiole of ♂ parallel-sided, carinate and longitudinally rugose, of ♀ punctate, in ♂ distinctly and in ♀ hardly bicarinate; anus of ♀ sub-compressed and apically white-marked; terebra straight. Legs normal, red, of ♀ with the hind tarsi alone infuscate; ♂ with the anterior paler, their coxae and trochanters stramineous; and the hind ones with

tarsi and apices of tibiae black. Wings normal, hyaline; radix and tegulae flavescent. Length, 4-6 mm.

It differs from *C. fortipes* in its smaller size, nearly smooth frons, narrower vertex, longer antennae and, in the female, longer flagellar joints and narrower pale central band.

This is a somewhat common species in Britain, though I have never personally met with it. Thornley has found it at Leverton, in Notts., in September. Tuck has taken several males at Benacre Broad, on the Suffolk coast, late in August, and a female at Aldeburgh towards the end of September; Piffard has found it at Felden, in Herts., and there is a full series in Capron's collection from Surrey; Wilson bred two examples of this species at York, from *Emphytus cinctus*, in May, 1881; and Bridgman records it from Earlham, near Norwich. It extends throughout the northern half of Europe.

MICROCRYPTUS, Thomson.

Thoms. O. E. ix. (1883), 850.

Head with cheeks elongate; clypeus truncate or produced, but not bidendate; face of ♂ often pale-marked. Antennae of ♀ always white-banded. Pronotal epomiae nearly wanting; metathoracic spiracles circular or oval-circular, rarely elongate; basal area laterally sub-parallel, and not transverse nor strongly convergent posteriorly; apophyses often acute; lateral sulci usually half the length of the mesosternum. Scutellum often pale. Abdomen nearly always abruptly red centrally; ♀ with basal segment generally entirely or apically red, terebra exerted. Radial nervure not emitted from beyond the centre of the stigma, and not, or hardly, longer from areolet to apex than from stigma to areolet; lower external angle of the discoidal cell obtuse or rectangular, never acute; fenestra entire.

Thomson (*loc. cit.*) remarks that, since the species of this genus have almost oval metathoracic spiracles, it appears more convenient to associate with them those Phygadeuonids with elongate spiracles which he had previously (O. E. vi. 599) placed in his genus *Plectrocryptus*, retaining that name solely then for the reception of *P. digitatus*, which differs from its original congeners in its black abdomen, broad peristomium, shorter cheeks, and longer and stronger mandibles. Schmiedeknecht, in 1905, however, has seen fit to disregard this revision (Ichn. Opusc. 592) and retains this group with elongate spiracles in the former genus, as did Ashmead, in 1900. A new genus appears to be needed to embrace the *Plectrocryptus* group of *Microcryptus* as here understood.

The species of this genus will easily be distinguished from those of *Phygadeuon* by their more elongate and slender facies, by the females' white-banded antennae and obsolete costulae, and by the profuse coloration, especially as regards the head, of the males. These latter are of very much more frequent occurrence, at least in Britain, than the females, which probably have more sluggish and retiring habits, and rarely disport themselves upon the sweets of umbelliferous flowers. Some of the males with pale tarsi are liable to be mistaken for those of our genus *Cryptus* until the metathoracic structure be examined, in fact *M. perspicillator* stood

for long in our catalogue as the alternate sex of *C. obscurus*, from which it is quite distinct. The mesosulcus (sternauli) must also be examined, since in coloration and the often deplanate post-petiole, the males resemble certain *Platylabi*, and some of the females bear such facies that they are separable by no other means from those of the genus *Cratichneumon* (cf. Ichn. Brit. i. 66).

Table of Species.

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|-------|-----|--|---------------------------|
| (10). | 1. | Metathoracic spiracles large and usually distinctly elongate. | |
| (9). | 2. | Post-petiole not punctulate; spiracles elongate (PLECTOCRYPTUS, Thoms.). | |
| (4). | 3. | Second segment finely punctate; ♂ face and scutellum black | 1. RUFIPES, Grav. |
| (3). | 4. | Second segment glabrous; ♂ scutellum and part of face pale. | |
| (6). | 5. | Anus red..... | 2. PERSPICILLATOR, Grav. |
| (5). | 6. | Anus black. | |
| (8). | 7. | Orbits of ♂ pale; apophyses of ♀ normal | 3. ARROGANS, Grav. |
| (7). | 8. | Orbits of ♂ immaculate; apophyses of ♀ stout | 4. FLAVOPUNCTATUS, Bridg. |
| (2). | 9. | Post-petiole punctulate; spiracles rotund-oval | 5. SUBGUTTATUS, Grav. |
| (1). | 10. | Metathoracic spiracles small and sub-circular (MICROCRYPTUS, auctt.). | |
| (18). | 11. | Post-annellus not or hardly longer than scape; ♀ flagellum dilated; ♂ face black. | |
| (13). | 12. | Metathoracic costulae entire; mesopleurae strongly punctate | 6. IMPROBUS, Grav. |
| (12). | 13. | Metathoracic costulae wanting or mesopleurae not strongly punctate. | |
| (15). | 14. | Areola entire; terebra one-third length of abdomen | 7. RUFONIGER, Bridg. |
| (14). | 15. | Areola basally incomplete; terebra half length of abdomen. | |
| (17). | 16. | Metanotum evenly punctate and deplanate; petiole of ♀ red | 8. GRAMINICOLA, Grav. |
| (16). | 17. | Metanotum coriaceous and convex; petiole black | 9. SPINOLAE, Grav. |
| (11). | 18. | Post-annellus longer than scape; ♀ flagellum filiform; ♂ head usually pale-marked. | |
| (20). | 19. | Frons closely and strongly punctate; apophyses stout | 10. BIFRONS, Gmel. |
| (19). | 20. | Frons not closely and strongly punctate; apophyses slender or wanting. | |
| (36). | 21. | Petiolar area elongate; frontal orbits of ♂, and often of ♀, not black. | |
| (25). | 22. | Spiracular area right-angled inferiorly; scutellum entirely immaculate. | |
| (24). | 23. | Apophyses distinct; frontal orbits white; coxae black | 11. ABDOMINATOR, Grav. |
| (23). | 24. | Apophyses wanting; frontal orbits and coxae red | 12. ERRATOR, Marsh. |

- (22). 25. Spiracular area not right-angled; scutellum of ♂ white, of ♀ usually rufescent.
- (27). 26. Head distinctly narrowed posteriorly; frontal orbits white ... 13. ARRIDENS, Grav.
- (26). 27. Head less distinctly narrowed posteriorly; frontal orbits of ♀ not white.
- (33). 28. Clypeus not apically produced in the centre.
- (30). 29. Anus white..... 14. GALACTINUS, Grav.
- (29). 30. Anus not white.
- (32). 31. Frons of ♂ not finely punctate; wings of ♀ normal 15. LEUCOSTICTUS, Grav.
- (31). 32. Frons of ♂ finely punctate; wings of ♀ rudimentary 16. NIGROCINCTUS, Grav.
- (28). 33. Clypeus apically produced in the centre.
- (35). 34. Basal segment normal; coxae black; petiolar area elongate 17. CRETATUS, Grav.
- (34). 35. Basal segment stout; coxae white; petiolar area normal 18. LARVATUS, Grav.
- (21). 36. Petiolar area not elongate; frontal orbits immaculate.
- (38). 37. Tibiae basally white-banded 19. BASIZONIUS, Grav.
- (37). 38. Tibiae not white-banded.
- (46). 39. Metathoracic costae distinct; ♀ macropterous.
- (41). 40. Petiolar area reaching centre; abdomen sericeous 20. SERICANS, Grav.
- (40). 41. Petiolar area not reaching centre; abdomen sparsely pilose.
- (43). 42. Areola basally incomplete; hind tarsi white-banded 21. TRICINCTUS, Grav.
- (42). 43. Areola entire; hind tarsi not white.
- (45). 44. Mesopleurae rugulose; metapleurae irregularly rugulose 22. ERYTHRINUS, Grav.
- (44). 45. Mesopleurae coriaceous; metapleurae transcostate 23. SPERATOR, Müll.
- (39). 46. Metathoracic costae ♂ sub-obsolete; ♀ brachypterous.
- (50). 47. Clypeus of ♂ apically produced; ♀ thorax black.
- (49). 48. Head twice broader than thorax..... 24. GRAVICEPS, Marsh.
- (48). 49. Head of normal breadth 25. BRACHYPTERUS, Grav.
- (47). 50. Clypeus of ♂ not produced; ♀ thorax mainly red.
- (52). 51. Basal segment of ♀ only partly red; ♂ with orbits pale and clypeus black 26. MICROPTERUS, Grav.
- (51). 52. Basal segment of ♀ entirely red; ♂ orbits black and clypeus pale ... 27. LABRALIS, Grav.

A Colour Table of the Males.

- (20). 1. Scutellum at least partly white.
- (3). 2. Anus broadly white 8. GRAMINICOLA.
- (2). 3. Anus not white.
- (5). 4. Tibiae white-banded 19. BASIZONIUS.

(4).	5.	Tibiae not white-marked.	
(7).	6.	Face entirely white.....	13. ARRIDENS.
(6).	7.	Face not or only partly white.	
(9).	8.	Orbits not white	4. FLAVOPUNCTATUS.
(8).	9.	Orbits at least partly white.	
(15).	10.	Hind tarsi white-banded.	
(14).	11.	Pronotum not white.	
(13).	12.	Callosity beneath radix white	2. PERSPICILLATOR.
(12).	13.	Callosity beneath radix not white	3. ARROGANS.
(11).	14.	Pronotum white	15. LEUCOSTICTUS.
(10).	15.	Hind tarsi not white-marked.	
(19).	16.	Pronotum not white.	
(18).	17.	Callosities at radix not white	16. NIGROCINCTUS.
(17).	18.	Callosities at radix white	18. LARVATUS
(16).	19.	Pronotum white	17. CRETATUS.
(1).	20.	Scutellum black.	
(26).	21.	Head not white-marked.	
(23).	22.	Antennae centrally white-banded	6. IMPROBUS.
(22).	23.	Antennae not white-banded.	
(25).	24.	Hind femora apically black	20. SERICANS.
(24).	25.	Hind femora entirely red	1. RUFIPES.
(21).	26.	Head white-marked.	
(28).	27.	Face not white-marked	27. LABRALIS.
(27).	28.	Face entirely or laterally white.	
(32).	29.	Whole face white.	
(31).	30.	Pronotum and cheeks not white	10. BIFRONS.
(30).	31.	Pronotum, and often cheeks, white.....	14. GALACTINUS.
(29).	32.	Only the orbits, and sometimes epistoma white.	
(34).	33.	Anus white (<i>cf.</i> also No. 22).....	23. SPERATOR.
(33).	34.	Anus not white.	
(38).	35.	Hind tarsi white-banded.	
(37).	36.	Callosities at radix white	5. SUBGUTTATUS.
(36).	37.	Callosities at radix not white	21. TRICINCTUS.
(35).	38.	Hind tarsi not white-banded.	
(40).	39.	Vertical dots white.....	11. ABDOMINATOR.
(39).	40.	Vertex immaculate.	
(44).	41.	Clypeus not white.	
(43).	42.	Anterior trochanters white	26. MICROPTERUS.
(42).	43.	Anterior trochanters not white.....	25. BRACHYPTERUS.
(41).	44.	Clypeus white	22. ERYTHRINUS.

1. *rufipes*, Grav.

Ichneumon curvus, Schr. F. B. II. ii. n. 2087, ♀. *Phygadeuon curvus*, Gr. I. E. ii. 679, *cf.* i. Suppl. 706; Ste. Ill. M. vii. 299; Ratz. Ichn. d. Forst. i. 146; Tasch. Zeits. Ges. Nat. 1865, p. 42, ♀. *Cryptus rufipes*, Gr. I. E. ii. 453; Tasch. Zeits. Ges. Nat. 1865, p. 71, ♂. *Plectocryptus curvus*, Thoms. O. E. vi. 599. *Microcryptus curvus*, Thoms. lib. cit. ix. 854, 1 ♂ ♀; *cf.* xxi. 2383.

Head anteriorly nearly triangular, frons closely and coarsely punctate and pubescent, with the scrobes somewhat large; clypeus discreted, shining and apically truncate; mandibles stout, with equal teeth, cheeks buccate, epistoma intumescent; vertex abruptly declived posteriorly, but not angularly emarginate centrally; mouth and usually part of the mandibles rufescent; ♂ face immaculate. Antennae black; of ♀ stout, filiform,

1 Thomson, by a *lapsus calami*, here indicates *fulvipes*, Grav., as its ♂; this is only a repetition of *rufipes*, Grav., as given before.

obtuse and not abruptly attenuate apically, with the post-annellus longer than the scape, centrally white-banded and beneath rufescent; of ♂ rarely with the flagellum mainly ferrugineous. Thorax somewhat nitidulous and pubescent; mesonotum, especially in the ♀, coarsely punctate; metathorax rugose, areae complete and areola transverse in the ♂; ♀ with the areola triangular, apically straight, with no costulae; basal area and apophyses distinct; spiracles large and oval. Scutellum in both sexes black, of ♀ deplanate. Abdomen of ♀ ovate and as broad as the thorax, of the ♂ elongate-lanceolate, black, with at most the margin of the second segment castaneous; ♀ with the second, third and apex of the first segment, red, and the seventh and eighth white-marked; petiole glabrous, with distinct carinae, apically dilated and very slightly curved laterally, of ♀ transverse; second segment distinctly, though very finely, punctate; terebra as long as the metatarsus. Legs not short and of ♀ somewhat stout; red, with coxae, trochanters, the sparsely but evidently spinulose hind tibiae except basally, and their tarsi, black. Wings somewhat clouded; radix rufescent, of ♂ stramineous; tegulae infusate. Length, 8–10 mm.

Bouché (Naturg. 144) tells us the larva of this species is elongate, fleshy and white, glabrous and finely wrinkled; the mouth organs of the rounded head are indicated by brown lines, with only the mandibles distinctly movable; the imaginal six legs are represented by yellow dots; the stigmata are very small and stramineous; its length is four lines. He adds that it preys upon the larvae of *Geometra piniaria*, but that it evacuates the host and pupates on the earth in an elliptic, sooty black, papyraceous cocoon.

This species is common throughout the whole of Europe. Gravenhorst, who took the female on umbelliferous flowers in August, says that Hope found several specimens of the same sex about Netley, in Shropshire; and Stephens adds that the female used to be rare about London in June. I have seen females taken by Luff in Alderney, Piffard at Felden, Miss Chawner in the New Forest; on November 3rd, 1894, I swept a ♂ in the Bentley Woods in Suffolk, and possess another male captured by Verbury, at Parknasilla, in Ireland, on 22nd July, 1901.

[Since the above was written, I have received from Mr. James Waterston what is undoubtedly the true female of *M. rufipes*, Grav. This is very satisfactory, since *Ichneumon curvus* is so very dissimilar from *Cryptus rufipes* as to have always left considerable doubt in my mind concerning the propriety of Thomson's (presumably arbitrary) conjunction of these species. It now remains to discover the ♂ of *I. curvus*. Mr. Waterston's female is:—

Black, with the anterior tibiae and tarsi and all the femora alone red; the antennae have the five central flagellar joints white above. Head anteriorly nearly triangular, frons closely and coarsely punctate and pubescent, with the scrobes somewhat large; the clypeus discreted, punctate and apically truncate; mandibles stout, with equal teeth; cheeks straight, not buccate, and much longer than base of mandibles; epistoma intumescent; vertex abruptly declived, but not emarginate, posteriorly; palpi and ligula piceous. Antennae somewhat slender and basally sub-attenuate, with the apex obtuse; post-annellus slightly longer than the scape and, with the two following joints, apically sub-nodulose. Thorax nitidulous;

mesonotum evenly, distinctly and somewhat finely punctate, with elongate notauli; metathorax rugulose, with all the areae obsolete, though traceable; areola semicircular and a little broader than long, with the apex weak and truncate; costulae wanting, basal area rectangular and very short, apophyses distinct; spiracles large and oval. Scutellum black, of the same convexity as that of ♂. Abdomen oblong, not broader than thorax, immaculate; petiole glabrous, with distinct carinae, apically dilated and laterally straight, post-petiole transverse; remainder of abdomen nitidulous and finely alutaceous throughout; terebra one-third the length of the abdomen. Legs somewhat slender, with the femora not stout; extreme base of hind tibiae also rufescent. Wings slightly clouded; radix castaneous, tegulae black. Length, 9 mm.

This female was captured at Whiting Bay, in the Isle of Arran, 6th to 20th September, 1903. Chitty has also found it at Loch Awe, in May, 1893.]

2. *perspicillator*, Grav.

Cryptus perspicillator, Gr. I. E. ii. 503; Ste. Ill. M. vii. 283; Holmgr. Sv. Ak. Handl. 1854, p. 52; Tasch. Zeits. Ges. Nat. 1865, p. 82, ♂. *Phygadeuon abdominalis*, var. 3, Gr. I. E. ii. 728, ♀. *P. obscuripes*, Tasch. Zeits. Ges. Nat. 1865, p. 43, excl. ♂. *Plectrocryptus perspicillator*, Thoms. O. E. vi. 601, ♂; Schm. Opusc. Ichn. 599, ♂ ♀. *Microcryptus perspicillator*, Thoms. O. E. ix. 854, ♂ ♀. Var. *Cryptus leucotarsus*, Gr. I. E. ii. 524; Ste. Ill. M. vii. 285; Tasch. Zeits. Ges. Nat. 1865, p. 93, ♂.

Head with the vertex not angularly emarginate centrally; of ♂ very finely punctate, nearly smooth and somewhat shining, with the mandibles, palpi, the broad cheeks, external orbits partly and the internal entirely, generally a V-shaped facial mark and the clypeus, white; ♀ with the palpi and the frontal orbits red. Antennae of ♂ setaceous and black, with the scape white beneath; of the ♀ not abruptly attenuate apically, centrally white, with the post-annellus longer than the scape. Thorax of ♂ with a white callosity beneath the radix, and the notauli extending nearly to the disc of the mesonotum; ♀ costulae wanting and apophyses normal; spiracles large and oval. Scutellum of ♀ black; of ♂ at least apically, as well as sometimes the post-scutellum, white. Abdomen red, with the first segment, except generally its apex, and in ♂ base of the second, black; post-petiole smooth, of ♂ slightly longer than broad; second segment alutaceous, not punctate; terebra hardly half the length of the abdomen. Legs slender and black; anterior femora, tibiae and tarsi red; femora of ♀ except at apex, and ♂ with the intermediate and usually front ones basally, black; base and apex of the hind femora, and base of their hardly spinulose tibiae, red; central joints of hind tarsi in ♂ white, in ♀ flavous, with their apices rufescent; ♂ with trochanters apically red, the front coxae usually white beneath and the intermediate tarsi infuscate. Wings slightly clouded; radix and tegulae stramineous, latter in ♂ often partly or entirely infuscate. Length, 8-10 mm.

The male is very like that of *M. curvus* in size and conformation, but the colour of the abdomen, legs and head, and the much more finely punctate mesonotum will distinguish it, as will the white (joints one and base of five excepted) hind tarsi, orbits and mouth, scutellar and frontal marks from *M. abdominalis*; the female agrees with the latter species in its smooth red abdomen and in the terebra being a little longer than the black petiole, but differs in the rufescent frontal orbits, oval metathoracic spiracles, the

longer and black seven basal antennal joints, of which the following five or six are white, with the hind tarsi dull testaceous, becoming paler towards their apices.

I can find nothing in the description of *C. leucotarsus* to justify specific rank, excepting, perhaps, Gravenhorst's vague note that the whole body is more incrassate, with the legs shorter and stouter; Taschenberg says the hind legs are not elongate, with the femora sub-inflated; but a specimen in my collection, named by Bridgman, agrees *ad amussim* with *M. perspicillator*; it has the clypeus and pronotum white, the front coxae piceous and the metathorax coriaceous, with the areola hexagonal and entire, with its lateral costae weak, the basal area parallel-sided, the petiolar not discreted and the spiracles oblong. The conformation of the metathorax will at once separate it from *Cryptus albatorius*, Vill., which it very strongly resembles in coloration.

The female of this species is so remarkably like that of *Cratichneumon lanius* (cf. Ichn. Brit. i. 68) that it is difficult to believe there is no close affinity between these species. The present, however, has the mesopleural sulci well defined, the antennae and legs longer, with the latter stouter and the body less nitidulous.

This is an abundant species and occurs throughout the Continent, where Gravenhorst took both sexes in July and the male in May. Stephens found it about London in June and in Shropshire; Bridgman at Earlham, near Norwich, in July, and he says it has been bred at Lynn from *Trachea piniperda*; the female is recorded from the Hastings district, and Fitch (Entom. 1880, p. 255) bred it from the marble galls of *Cynips Kollari* at Maldon. Doubtless most of the British records of this species are mixed among those of *Cryptus obscurus*, with which Marshall incorrectly synonymized it in his Catalogue. The variety *leucotarsus* is mentioned from London in June by Stephens, and from Essex by Harwood. I possess both sexes taken by Capron at Shere, by Piffard at Felden, and by myself in the Bentley Woods; females found in the New Forest by Miss Chawner; males at Guestling by Bloomfield, Greenings in Surrey by Wilson Saunders in May, 1872, and at Brockenhurst by myself in August. Chitty has taken males at Huntingfield and Doddington, in Kent, in June; and at Offchurch in September.

3. *arrogans*, Grav.

Cryptus arrogans, Gr. I. E. ii. 494; Ste. Ill. M. vii. 281; Holmgr. Sv. Ak. Handl. 1854, p. 51; Tasch. Zeits. Ges. Nat. 1865, p. 86, ♂. *Phygadeuon abominator*, var. 1, Gr. I. E. ii. 727, ♀. *Plectrocryptus arrogans*, Thoms. O. E. vi. 601, ♂; Schm. Ichn. Opusc. 599, ♂ ♀. (?) *P. senex*, Kriech. Ent. Nachr. vi. p. 55, ♂. *Microcryptus arrogans*, Thoms. O. E. ix. 855, ♂ ♀. Var. *Cryptus effeminatus*, Gr. I. E. ii. 532; Tasch. Zeits. Ges. Nat. 1865, p. 87, ♂. Var. *Mesoleptus albitarsus*, Gr. I. E. ii. 10, ♂; cf. Pfankuch, Zeits. Syst. Hym. 1905.

Head with the vertex not angularly emarginate centrally; ♀ with frontal orbits dull ferrugineous; ♂ with only the internal orbits, or with whole or part of the palpi, mandibles, labrum, cheeks, clypeal mark, centre of the epistoma, lower external orbits and the vertical dots also, white. Antennae of ♀ not abruptly attenuate apically, post-annellus longer than the scape, the five central joints white and the basal four of the flagellum ferrugineous beneath; of ♂ setaceous, with the scape usually white beneath. Thorax immaculate; ♀ costulae wanting and apophyses normal; spiracles

large and oval or oblong. Scutellum black; of ♂ nearly always wholly or partly, with sometimes also the post-scutellum, white. Abdomen red, with first segment except its apex, apical margin of the fourth in ♂ and fifth in ♀, and whole of the following, black; post-petiole sub-quadrate in ♂; second segment smooth; terebra nearly half the length of the abdomen. Legs of ♂ elongate, slender, coloured as in *M. perspicillator*, but with the anterior coxae not pale, and their femora and tibiae, with the hind tibiae to beyond their centre, red; of ♀ with the anterior femora apically red, the tibiae red with the apical half of the hind ones black, and the tarsi also red with the hind ones flavous and apically infusate; hind tibiae sparsely but evidently spinulose. Wings a little clouded; radix somewhat pale, tegulae infusate. Length, 7-10 mm.

The male variety *effeminatus* differs in nothing but its white antennal band.

From *M. abominator* this species may be known by the rather larger spiracles and rufo-testaceous anterior femora, tibiae and tarsi of the female and the white facial orbits and often scutellar marks of the male. The latter sex is distinguished from *M. rufipes* by its broadly black hind femora, white-marked hind tarsi and head, more finely punctate mesonotum and three red central abdominal segments, and from *M. perspicillator* it differs in the black anus and much narrower hind tarsal band.

The male of this species appears to be as common with us as the last-described and to have an equally wide Continental range, although Stephens says it was not very abundant near London in June. Bignell records it from Bickleigh at the beginning of August; Beaumont has given me specimens from Chobham and Boxhill in May and July; Martineau from Selsley and Solihull in the middle of May; Yerbury from Parknasilla, in Ireland, in July; I have several from Shere, in Dr. Capron's collection, and have taken it on the 5th and 22nd of August flying among reeds in a swampy place, in Matley Bog, in the New Forest, where it did not appear to be at all attracted by the abundant flowers of *Angelica*. It has been bred in Prussia from *Trachea piniperda* by Brischke.

4. *flavopunctatus*, Bridg.

Phygadeuon flavopunctatus, Bridg. Trans. Ent. Soc. 1889, p. 414, ♂. *Microcryptus clavatus*, Kriech. Ent. Nachr. 1893, p. 57, ♂. *M. armatus*, Kriech. lib. cit. p. 123, ♀. *Plectocryptus flavopunctatus*, Schm. Opusc. Ichn. 600, ♂ ♀.

♂. Head narrowed posteriorly, with the vertex not angularly emarginate centrally; frons punctate with the interstices finely reticulate; the apically rounded clypeus and the epistoma flavous, and all the orbits immaculate. Antennae about as long as body, with the basal flagellar joint four times longer than broad. Thorax nitidulous throughout; mesonotum somewhat coarsely punctate; metanotum apically rugulose, with the areola elongate, basally incomplete and with the costulae wanting; petiolar area rugose and not discreted; spiracles large and oval. Scutellum slightly gibbose and shining; flavous-marked, as also is sometimes the post-scutellum. Abdomen smooth and nitidulous, narrower than the thorax; black, with segments two to four and apex of the first red; post-petiole elongate, sub-parallel-sided, bicarinate and sub-strigose. Legs slender, black, with the anterior, excepting their coxae and trochanters, rufo-testaceous; the hind

ones with apices of trochanters, extreme base and apex of femora, and the basal third of the tibiae, with the calcaria, fulvous-red; the two central joints of the hind tarsi white and the tibiae somewhat spinulose. Wings sub-flavescent; tegulae piceous, radix flavous; discoidal cell externally obtuse below; nervellus intercepting the slightly antefurcal recurrent nervure below its centre. Length, 8-10 mm.

This male is said to be very closely allied to *M. perspicillator* and *arrogans*; from the former it differs in the black anus and from the latter, of which it is perhaps no more than a variety (allied to *var. b*, Thoms.), in the immaculate orbits.

♀. Head only slightly narrowed posteriorly, immaculate. Antennae filiform and only very slightly incrassate apically, with the basal flagellar joints discreted and the central four or five white. Mesothorax with somewhat long and fine pilosity, notauli distinct and the central depression broad and shallow; propleurae longitudinally strigose, mesopleurae rugosely punctate; metathoracic areae as in ♂, with the petiolar large and hexagonal with oblique marginal striation and strong apophyses. Abdomen oval and somewhat deplanate, with the second, third and apex of the first segments red; basal segment parallel-sided to its centre and thence explanate to apex; post-petiole strongly canaliculate, bicarinate and apically explanate laterally; seventh with apex white and terebra one-third length of body. Legs black, with anterior femora (except base of front femora), tibiae and tarsi, and sometimes base of hind tibiae, red. Wings with stigma piceous.

Kriechbaumer, who recognized neither his own former species nor Bridgman's as the male of his *M. armatus*, says it is probably most closely allied to *M. arrogans*, from which it differs specifically in the colour of the anterior legs and the white-marked anus, though the obtusely triangular or sub-acute apophyses are its most distinguishing feature.

Bridgman described this species from males taken at Mousehold Heath, near Norwich, early in October, 1881. The female is described from Corfu and, perhaps, also Piedmont; it is synonymized by Schmiedeknecht, but has never yet been recorded in Britain. I possess males captured by Dr. Capron, at Shere, in Surrey, and a single female, captured in July at Huntingfield, by Chitty.

5. *subguttatus*, Grav.

Cryptus subguttatus, Gr. I. E. ii. 610; Ste. Ill. M. vii. 292, ♂. *Phygadeuon subguttatus*, Tsch. Zeits. Ges. Nat. 1865, p. 54, ♂. *Cryptus punctatus*, Ratz. Ichn. d. Forst. i. 141; ii. 123; iii. 136, ♂ ♀. *C. incertus* et *C. abeissus*, Ratz. *lib. cit.* iii. 138. *C. contractus*, Gr. I. E. ii. 617; Tsch. Zeits. Ges. Nat. 1865, p. 104, ♀. *Microcryptus contractus*, Thoms. O. E. ix. 867, ♂ ♀.

Head somewhat narrowed behind the eyes, black, with the frons nearly smooth and the clypeus discreted; of ♂ with palpi, mandibular and genal marks, and the internal orbits broadly, white; of ♀ generally with the frontal orbits ferrugineous. Antennae of ♂ setaceous and slightly shorter than the body, with the scape white beneath; of ♀ sub-setaceous and slightly dilated before the apex, with the six central joints white. Thorax of ♂ usually with white callosities before and beneath the radix; mesopleurae nearly smooth; metathorax coarsely rugose, petiolar area reaching

beyond the centre, broad and discreted; areola entire and not transverse, apophyses obtuse; spiracles large and circular-oval. Scutellum black. Abdomen smooth and red, with the apical half black and the anus of the ♀ whitish; basal segment somewhat broad, petiole explanate and sometimes infusate; post-petiole of ♂ quadrate, parallel sided, canaliculate and, together with the second segment, closely and confluent punctate; terebra one fourth of the length of the abdomen. Legs red, with the coxae, trochanters, hind tarsi and apices of their tibiae and femora, black; of ♂ slender, with all the tarsi, especially the hind pair, centrally white. Wings normal, somewhat clouded; radix and tegulae of ♂ white, of ♀ infusate. Length, 9-11 mm.

In its facies and conformation the female resembles *Spilocryptus incubitor*, than which it has the terebra shorter and the antennae thicker; it resembles the *Crypti* in its elongate and sub-setaceous antennae, but differs distinctly in its complete metapleural costae and carinate petiole. The large size, elongate petiolar area, small peristomium, apically truncate and sub-reflexed clypeus, the dense and very fine puncturation of the whole body, and the coloration of the male head, thorax and tarsi will render it abundantly distinct in the present genus.

It may be that *C. longipes*, Ratz., should also be admitted as synonymous with this species. Ratzeburg says *C. punctatus* is extraordinarily like it in colour, but differs in many specimens (the difference is not *always* apparent) in the distinctly punctate abdomen and mesothorax, the stronger metathoracic costae and immaculate scutellum; on the other hand, the tegulae and callosity at their base are always white. Later (iii. 138) he maintains the distinction. His *C. abscissus* appears to be more strongly punctate than *C. punctatus*, but is separated entirely on account of its coloration. "I do not dare to place it 'among *punctatus*,' because it has no white on head, tegulae and scutellum," he writes.

This does not appear to be a species of unusual rarity in northern and central Europe, but I can find no British records since Stephens said it was very rare near London in June; and consequently confirmatory evidence of it as indigenous was very necessary. Gravenhorst took the male in meadows in June and the female in October; Brischke has bred it from *Lophyrus pini* and *L. similis* in Prussia. The only specimens I have seen are males, one of which I swept from long, rank grass at Matley Bog, in the New Forest, on 17th August, 1901; the other was taken by Chitty, at Dodington, in Kent.

6. *improbus*, Grav.

Phygadeuon improbus, Gr. I. E. ii. 670, excl. ♂ et var. 2; Tasch. Zeits. Ges. Nat. 1865, p. 36, excl. ♂. *Microcryptus improbus*, Thoms. O. E. ix. 851, ♂ ♀.

Head in both sexes black; ♀ with mandibles, except apically, and the palpi red, the latter in ♂ dull testaceous; frons convex, cheeks sub-buccate, clypeus strongly discreted and apically truncate. Antennae black; of ♀ sub-fusiform, centrally dilated and deplanate below, with the six basal joints red, at least beneath, and the five following white; post-annellus not or hardly longer than the red scape, in ♂ not longer. Metathorax somewhat smooth, distinctly punctate basally, with all the costae complete; petiolar area discreted; mesosternal sulci obsolete or wanting;

mesopleurae punctate. Scutellum black, its fovea deeply impressed. Abdomen of ♀ ovate; black, with segments two, three, base of fourth and apex of the first, red, and the seventh, together with the apex of the sixth, white; post-petiole smooth and shining, sub-quadrate, with the sides rounded and carinae wanting; terebra at least half the length of the abdomen. Legs of ♀ red, with apices of the hind femora and of their tibiae black; of ♂ flavous, with the coxae and trochanters black. Wings slightly narrow; stigma comparatively somewhat broad; the discoidal cell apically obtuse below; radix white, tegulae black. Length, 5-7 mm.

This is the only species of the present genus whose ♀ has the costulae entire, the clypeus deeply discreted, and the mesopleurae strongly punctate. Thomson has excluded Gravenhorst's male and substituted one whose coloration he does not very fully refer to, though its antennae would appear to be tricoloured.

In June and July this species is found throughout the northern half of Europe. Two males, taken at Earham, near Norwich, in September, were believed by Bridgman to be referable to *P. improbus*, Grav.; and Bignell records it from Bickleigh, in Devonshire, early in August. There appears to be some confusion in the British collections between this insect and *M. puncticollis*, Thoms., which now represents the original male of the present species. My females are from Capron's collection captured, probably, at Shere, in Surrey.

7. rufoniger, Bridg.

Phygadeuon (Microcryptus) rufoniger, Bridg. Trans. Ent. Soc. 1889, p. 415, ♀.

Head black, somewhat shining, punctate, not narrowed behind the eyes, scarcely as broad as the thorax. Antennae slightly longer than half the body, subfiliform, tricoloured; basal flagellar joint thrice longer than broad, sixth quadrate. Thorax somewhat shining, punctate; metathorax a little rugulose, costulae wanting, areola small and about as long as broad, narrower basally and deeply emarginate apically; spiracles small and almost circular. Scutellum black. Abdomen elongate-ovate, as broad as the thorax, smooth and shining; black, with three basal segments and the sides of the fourth red, anus immaculate; first segment with no carinae, the following transverse; terebra one-third of the length of the abdomen. Legs somewhat slender, red; hind ones with tarsi, apices of their tibiae and of their femora infusate. Wings clouded; areolet pentagonal, with the outer nervure sub-pellucid; discoidal cell apically rectangular below; lower wing with the first recurrent nervure scarcely antefurcal, intercepted below its centre; stigma and tegulae infusate. Length, 5 mm.

This species is said to be very like *M. improbus*, but with shorter antennae and terebra, thinner legs and no white anal marking; the costulae, moreover, are wanting. In the Norwich Museum collection it is placed next after *M. graminicola*.

Bridgman tells us several specimens of this species, whose male appears to be still unassociated, were taken in Ashdown Forest, on 10th November, 1885, probably at the roots of grass. These were exhibited at a meeting of the South London Ent. Soc. in March, 1890 (*cf.* E.M.M., 1890, p. 144). It does not appear to have yet been recognized on the Continent.

8. *graminicola*, Grav.

Cryptus brevicornis, Gr. I. E. ii. 511¹; Ste. Ill. M. vii. 283, ♂. *C. peregrinator*, var. 1, Gr. lib. cit. 606, ♀. *Phygadeuon graminicola*, Gr. lib. cit. 673; Tsch. Zeits. Ges. Nat. 1865, p. 41, ♀. *Microcryptus graminicola*, Thoms. O. E. ix. 852, ♂ ♀. Var *C. humilis*, Gr. I. E. ii. 604, ♂.

Both sexes are black and shining, with the head nearly triangular anteriorly, the vertex declived behind the eyes, scrobes not deeply impressed, clypeus sub-discreted, epistoma somewhat convex, cheeks not buccate and the post-annellus shorter than the scape; the mesopleurae are shining and not rugulose, but sparsely and somewhat finely punctate; the areola is incomplete basally, with no costulae; the basal segment is smooth, in ♀ entirely and in ♂ with the post-petiole red; calcaria somewhat elongate; tegulae black, radix dark. Length, 6–8 mm.

♀. Head with clypeus discreted, frons sparsely punctulate; epistoma intumescent and sometimes red. Antennae somewhat strongly incrassate beyond their centre and apically attenuate, with the four central joints white, the basal flagellar joints (at least beneath) and sometimes the scape, red. Metanotum smooth and deplanate; spiracles circular and comparatively large. Scutellum black, with its apex and the post-scutellum sometimes rufescent. Abdomen pale red, with the four apical segments black, and the last two obsoletely white-margined; post-petiole laterally curved and abruptly explanate; terebra longer than half the abdomen, with the spicula acuminate and not obliquely truncate apically. Legs red; anterior femora more or less black basally above; the hind ones, except at their base, the apices of their tibiae and their tarsi, black.

♂. Antennae short, stout, setaceous, a little longer than half the length of the body; scutellum and post-scutellum (in the type form) white. Abdomen red, with base of the first and the four apical segments black, the last two dorsally white-margined; petiolar carinae obsolete. Legs red, with the coxae, trochanters, the centrally white posterior or hind tarsi, apices of the hind femora and of their tibiae always, black, together with the base of the latter and sometimes of the anterior femora; the anterior tibiae usually stramineous in front.

The male variety *humilis*, which has been found early in September on *Vaccinium Myrtillus* on the Continent, differs in having the scutellum and post-scutellum black, with the legs darker and the central segments discally infusate.

This species is by no means uncommon here and abroad. Stephens records it from Hereford in July, 1835,² and about London; Bridgman from Brundall and Lakenham, in Norfolk; Bignell from Bickleigh at the end of August; and Marshall from Yorkshire. It is said to be parasitic upon *Zygaena trifolii* (Schm.), and I have found it in Holbon Marsh, in Suffolk, where this moth is abundant, on 25th August, 1898. Dr. Capron appears to have taken it commonly at Shere, in Surrey, since both sexes are well represented in his collection; and Rev. E. N. Bloomfield has sent me the male from Guestling, near Hastings.

¹ It appears advisable to retain Thomson's name for this species, since *brevicornis*, which should stand in strict priority, might clash with *Cubocephalus brevicornis*, Tsch.; and *C. humilis* is a variety.

² Stephens' ♀ ♀, however, which are still *in situ* in the British Museum, belong to the Tryphonid genus *Polyblastus*!

9. *Spinolae*, Grav.

Phygadeuon Spinolae, Gr. I. E. ii. 712 et i. Suppl. 708; Ste. Ill. M. vii. 301; Tasch. Zeits. Ges. Nat. 1865, p. 45, ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1882, p. 342.

Head black, with the palpi and mandibles centrally ferrugineous; clypeus discreted and epistoma prominent. Antennae hardly longer than half the body, sub-dilated beyond the centre and apically attenuate; infusate, with the two central joints white, and the five basal ferrugineous beneath. Thorax immaculate; metathorax convex and not smooth, with the basal transverse costa wanting; areola indicated, its apical costa trisinate; petiolar area not concave, apophyses small, spiracles not quite circular. Scutellum black. Abdomen oblong-ovate, as broad as the thorax; black, with segments two to four and apex of the first red, seventh, and sometimes the sixth, apically white; basal segment slightly curved laterally; post-petiole glabrous, not longer than broad; terebra half the length of the abdomen. Legs normal, red; anterior, with trochanters and femora laterally infusate; hind tarsi, apices of tibiae and femora, except at the base, black. Wings sub-hyaline; tegulae black, radix whitish. Length, 7 mm.

This female is very closely related to *M. graminicola*, from which the narrower flagellar white band, convex and not evenly punctate metanotum will serve to distinguish it, although it is, perhaps, hardly more than a variety of that species.

Both Brischke's Prussian specimens and the single example taken by Hope, near Netley, in Shropshire, upon which alone it finds a position in our catalogue, had the basal segment entirely red. Stephens' record from London, in June, hardly obviates the necessity of confirming this species, if such it be, as British.

10. *bifrons*, Gmel.

Ichneumon bifrons, Gmel. S. N. i. 2718, ♂. *Phygadeuon bifrons*, Gr. I. E. ii. 698; Holmgr. Sv. Ak. Handl. 1854, p. 56; Tasch. Ges. Nat. 1865, p. 30, ♂. *P. gravipes*, Gr. I. E. ii. 740; Ste. Ill. M. vii. 304; Tasch. Zeits. Ges. Nat. 1865, p. 36, ♀. *Microcryptus gravipes*, Thoms. O. E. ix. 866, ♂ ♀.

Head sub-pubescent, black; frons very distinctly, finely and closely punctate, convex; ♀ with the mouth and clypeus fulvous, the latter apically deflexed, in ♂ apically rounded, and in both sexes somewhat deeply discreted; ♂ with the mouth and whole of the face white. Antennae piceous; of ♂ flavous, with scape white beneath; of ♀ filiform, sub-incrassate apically, with the six basal joints fulvous, the five following white, and the remainder (sometimes also the fifth and sixth) black. Thorax immaculate and finely pubescent; petiolar area discreted and excavate; spiracles circular and the apophyses small, though stout; metathorax of ♀ somewhat smooth, of ♂ transversely rugulose; ♀ with areae complete, the areola basally truncate and broader apically, of ♂ semi-circular. Scutellum black. Abdomen finely pubescent, smooth and strongly nitidulous; black, with the three basal segments (except the ♂ petiole) and more or less of the fourth basally, red; ♀ anus white-marked; post-petiole gradually explanate, somewhat broad and carinate, of ♂ together with the second segment sub-aciculate; terebra as long as the

basal segment. Legs of ♀ entirely red, or with the apices of the hind femora, and more rarely of their tibiae, infusate; of ♂ with the anterior coxae and trochanters wholly white, hind ones with the coxae basally black and the apices of their femora, tibiae, and of the tarsal joints, infusate. Wings of both sexes normal, somewhat clouded, ♀ with outer nervure of the areolet sub-obsolete; radix and tegulae white, latter in ♀ dark ferrugineous. Length, 5-7 mm.

The sub-quadrilobulate metathorax allies this species with those of *Rhembobius*; the petiolar area is nearly parallel-sided, and reaches far beyond the centre of the metathorax. From all the other species of this genus it differs in its closely punctate frons, deeply discreted clypeus, the extent of red coloration of the fully winged ♀, and the entirely white ♂ anterior coxae and pale antennae.

On the Continent it is still known by its later female name.

It occurs throughout central and northern Europe, where it is probably not rare at the roots of *Juncus bufonius* in damp places, in which situation I took several females, together with *Hemiteles varicornis*, towards the end of July, 1904. Stephens says it was not common near London, in June; and Bignell has sent it to me from Devon, and Thornley from Retford. I also possess a single male, captured by Col. Verbury at Pembridge, on 15th July, 1902; and have seen females taken by Evans at Midcalder, in Midlothian; and Boness, in Linlithgow in June.

II. *abdominator*, Grav.

Phygadeuon abdominator, Gr. I. E. ii. 726, et i. Suppl. 709, excell. varr. et ♂¹; Ste. Ill. M. vii. 302, excl. ♂; Holmgr. Sv. Ak. Handl. 1854, p. 56; Tasch. Zeits. Ges. Nat. 1865, p. 43, excl. ♂. *P. jejulator*, Gr. I. E. ii. 715, excell. varr.; Tasch. Zeits. Ges. Nat. 1865, p. 28, ♂. *Microcryptus abdominator*, Thoms. O. E. ix. 855, ♂ ♀; cf. Kriech. Ent. Nachr. 1893, p. 123.

Head nearly cubical; cheeks buccate, long and broad, with the genal costa continuous; frons strongly and sparsely punctate; clypeus discreted, apically rounded and sub-produced centrally, sometimes in ♂ white; ♀ with only the frontal, ♂ with internal orbits, as well as often a vertical dot and part of the face, white. Antennae with scape only slightly excised apically, of ♂ elongate, with the scape often white beneath; flagellum of ♀ black, with joints five to eleven white, a little incrassate gradually towards the obtuse apex. Thorax immaculate, sub-pubescent; apophyses somewhat prominent; spiracles small and circular, and the lower angle of the spiracular area rectangular; ♂ with distinct costae, the areola transverse and regularly, with the rest of the metathorax coarsely, rugose; ♀ with the areola hexagonal and narrowed basally, and the rest of the metathorax alutaceous. Scutellum deplanate, in both sexes black. Abdomen somewhat pubescent, not alutaceous nor apically white-marked; rufo-castaneous with the basal segment mainly black and the ♂ anus infusate; of ♂ elongate-ovate and narrower than the thorax, with the post-petiole elongate, aciculate, parallel-sided, with a shining central impression; and of ♀ sub-compressed posteriorly, with the post-

¹ It may be of use to here note the synonymy of *Phygadeuon abdominator*, Grav.:—Typ. ♀ = *Microcryptus abdominator* (here described); typ. ♂ = *M. orbitalis* (Thoms.) = *P. profligator*, var. 4 (Tasch.); var. 1, ♀ = *M. arrogans* (Thoms.); var. 1, ♂ = *P. profligator*, var. 5 (Tasch.) = *M. basizonius*, var. 3, Grav. (Tasch.); var. 2, ♀ = *P. aberrans* (Tasch.) = *Cratichneumon lanius* (Bridg. Trans. Ent. Soc. 1881, p. 152); var. 3, ♀ = *P. obscuripes* (Tasch.) = *M. perspicillator* (Thoms.).

petiole smooth, glabrous and gradually explanately curved laterally ; terebra shorter than half the abdomen. Legs black, with the spinulose anterior tibiae, tarsi and apices of their femora, together with the base of the hind tibiae, red ; hind femora incrassate, closely punctate, black. Wings subhyaline ; radix stramineous, tegulae dull red, of ♂ sometimes white. Length, 5-8 mm.

Thomson says this species may easily be recognized by its continuous costa, white ♀ frontal orbits, often concolorous vertical dots, and centrally produced clypeus. The males assigned to it by both Gravenhorst and Taschenberg are quite distinct from the above, as will be seen by its synonymy given in the footnote. Kriechbaumer thought Thomson's ♂ referable to *P. jejunator*, var. 2, Grav., with orbits partly pale and clypeus immaculate ; this is, however, ascribed to *Microcryptus brachypterus*.

This is an abundant palaearctic species, and is found commonly in Britain on the undergrowth in woods, the herbage in grassy lanes and upon the flower tables of *Heracleum sphondylium* and *Chaerophyllum sylvestre* in May and June ; but I have heard of no occasion upon which it had been bred until I myself had the satisfaction of finding that a male had emerged on the 14th April, 1902, from the puparium of a small Tachinid fly (probably *Digonochaeta spinipennis*, Mg.), collected in the New Forest during the previous August ; it was dead when discovered, leading one to the conclusion that during life it must have hidden away in a most effective manner, since I had looked into its box daily. We have records of this species from the Hastings district, Maldon in Essex, Bickleigh in Devon, in the middle of June and the beginning of August, and as common in Norfolk, at Eaton, etc. I possess specimens from Tostock, in Suffolk (Tuck), Cromer (Elliott), several from Shere, in Surrey (Capron), Felden, in Herts. (Piffard), Shifnal, in June (Beaumont), Cannock Chase (Tomlin), New Forest (Chawner), Mablethorpe, in Lincs. and South Leverton, in Notts. (Thornley), Greenings, in Surrey (Wilson Saunders), Guestling, in Sussex (Bloomfield), King's Cross, in Arran, Crookston, Cramvas and Darr, in Ayrshire, in June, July and August (Dalglish). Personally I have only taken one male in August : they have always occurred to me in May and June, at Bentley Woods, Orwell Park, Tuddenham Fen, Burgh Castle and Wherstead, in Suffolk, and Wicken Fen, in Cambs. The female I have invariably caught in June, the dates ranging from the 14th to the 17th only, by beating oak and birch in Stanstead Wood, Staverton Thicks, Bentley and Moulton, in Suffolk. I also have males taken in May, at Rossbeigh, in Co. Kerry, Freshford, near Bath, Oulton and Barnby Broads, and at Brandon ; and Chitty has several times captured it at Huntingfield, in Kent.

12. *errator*, Marsh.

Phygadeuon errator, Marsh. E.M.M. v. 154, ♀.

Head black, with frontal orbits and palpi red ; vertex with a broad and shining fovea behind the antennae. Antennae dark ferrugineous, filiform and moderately stout, with joints seven to twelve white. Thorax immaculate ; metathorax pubescent and rugulose, with the spiracular and pleural areas alone distinct ; the petiolar area basally entire : apophyses wanting, spiracles orbicular. Scutellum black. Abdomen elongate, glabrous and

nitidulous, red; apically sub-compressed and laterally pubescent; basal segment long and somewhat slender, black and apically red in the centre, a little shorter than the terebra, with the spiracles not prominent. Legs red; posterior femora centrally, the hind tibiae, except at their base, and their tarsi entirely, black. Wings clouded; radix and tegulae red; areolet pentagonal, with the external nervure obsolete. Length, 8 mm.

Marshall says that this female might be referred to the genus *Ichneumon* if its terebra were not exerted. He makes no mention of a mesopleural sulcus, but adds that it is allied to *P. desertor*, Grav., from which it differs in the number of white flagellar joints, the coloration of the legs and in the sculpture of the metathorax.

"One specimen from the London District" (Marshall). It does not appear to have been found nor acknowledged on the Continent. The type is in the British Natural History Museum.

13. *arridens*, Grav.

Phygadeuon arridens, Gr. I. E. ii. 654; Tasch. Zeits. Ges. Nat. 1865, p. 45, ♂. *P. improbus*, var. 2, Gr. I. E. ii. 672, ♀. *P. probus*, Tasch. Zeits. Ges. Nat. 1865, p. 42, ♀; cf. Bridg. Trans. Ent. Soc. 1881, p. 152. *Ichneumon niveatus*, Desv. Cat. 25, ♂; cf. Morl. E.M.M. 1902, p. 123 et Ichn. Brit. i. 134. *Microcryptus arridens*, Thoms. O. E. ix. 859, ♂ ♀.

Head black, strongly narrowed behind the eyes; epistoma convex, clypeus discreted; frontal orbits in both sexes, and in ♂ the face, cheeks and mouth, white. Antennae of ♂ setaceous, nigrescent, and nearly as long as the body, with the scape white beneath; of ♀ with joints seven to eleven white, and the basal ones rufescent below. Thorax black; mesonotum sub-glabrous, centrally depressed, with distinct notauli; apophyses wanting, the obsolete discreted petiolar area not reaching beyond the centre of the finely rugulose metathorax, which has the areola in ♀ more or less elongate and distinctly indicated, and in ♂ sub-quadrate; spiracles very small and sub-circular, metapleurae not rugose; ♂ with pronotum anteriorly and laterally, and two callosities before the radix, white. Scutellum of ♂ either entirely or apically white; of ♀ immaculate. Abdomen elongate-ovate and as broad as thorax in ♀, narrower than the thorax and oblong-fusiform in the ♂; black, with the second to fourth segments, apex of the first and in ♂ the fourth discally or apically red, with the following sometimes pale-margined and the ♀ anus white; post-petiole glabrous and gradually dilated towards the apex, of ♂ slender, with distinct carinae, of ♀ deplanate and distinctly margined laterally; terebra straight and one third shorter than the abdomen. Legs slender and red; the apices of the hind femora, and in ♂ nearly the apical half of their tibiae, black; ♀ with the front trochanters, ♂ with the hind coxae and bases of their trochanters and their tarsi, also black; anterior coxae and trochanters of ♂ white. Wings hyaline; radix and the ♂ tegulae white. Length, 5-8 mm.

This species may at once be known from all the rest of the genus by its posteriorly narrowed head, nearly smooth and distinctly sulcate mesopleurae, smooth and shining abdomen, with the segments two to four of the ♂ red or basally dark castaneous, the elongate ♂ antennae of which seven flagellar joints bear elevated lines; by those of the ♀ being apically

sub-attenuate and black, with the central joints white above,¹ and by the frontal orbits of the ♂ being entirely, and of the ♀ with a line, white.

The development of the ♀ metathoracic costae appears to be variable, and the ♂ abdomen varies greatly in colour, being sometimes no more than dull badious in the centre. Care must be exercised in separating the latter sex from that of the next species, which it closely resembles in colour and conformation, especially of the head; it differs in having the frontal orbits more broadly white, the scutellum always white-marked, the areola more distinctly defined, the petiole carinate and the areolet entire, with the outer nervure very distinct.

This species is not uncommon in northern and central Europe, and Bridgman (*loc. cit.*) records the female from the neighbourhood of Norwich and, later, the male as common in Norfolk. Bignell has found both sexes at Bickleigh, in Devon, in August and September; Mr. Albert Piffard has given me a male which he found at Felden, in Herts., early in June, 1900; and I possess several females from Shere, in Dr. Capron's collection. The male has occurred to me in June, at Lakenheath, on fennel flowers at Alderton, in Suffolk, in September, and at Lyndhurst, in the New Forest, early in August. Beaumont took it at Kilmore, in Ireland, and Harting in Sussex; Charbonnier at Redland, near Bristol, in May; Wilson Saunders at Greenings, in Surrey, in June; and Tuck in Finborough Park, in Suffolk, as late as 19th October.

14. *galactinus*, Grav.

Phygadeuon galactinus, Gr. I. E. ii. 683; Ste. Ill. M. vii. 299; Tasch. Zeits. Ges. Nat. 1865, p. 54, ♂; cf. Brisch. Schr. Nat. Ges. Danz. 1882, p. 341. *P. fulgens*, Tasch. Zeits. Ges. Nat. 1865, p. 36, ♀.

♀. Head black, with red palpi; clypeus discreted with deep basal foveae. Antennae filiform, apically obtuse, centrally white-banded, and basally red only beneath. Thorax and scutellum black; metathorax convex, with the areae complete and distinct; spiracles small and circular. Abdomen strongly nitidulous, ovate, with the apex of the second segment as broad as the thorax; black, with the post-petiole and the two following segments red, the anus white; basal segment gradually explanate, laterally curved, dorsally sub-deplanate and nitidulous, with obsolete carinae and no aciculation; terebra half the length of the abdomen. Legs red, with coxae, tarsi and apices of the hind tibiae black; intermediate tibiae simple. Wings with the radix white. Length, 7 mm.

♂. Head black, with mouth, the discreted clypeus, internal orbits, and sometimes a facial dot, or the whole face and cheeks, white; mandibles apically infuscate. Antennae sub-setaceous, nearly half as long again as the body; scape white beneath. Thorax and scutellum black, with the pronotum and a callosity beneath the radix white; metathorax coarsely scabrous, with the costae indistinct; areola small, quadrate, all ill-defined; petiolar area reaching beyond the centre, discreted and somewhat pointed, with the apophyses wanting; spiracles circular. Abdomen pubescent and nitidulous, sub-cylindrical and slightly narrower than the thorax; black, with the second, third, and sometimes apex of the first segment, pale red or castaneous; fourth obsoletely rufescent and the anal membrane white;

¹ Thomson calls the ♀ antennae bicoloured, making no reference to a red base.

basal segment only slightly explanate, glabrous and pubescent, sub-canaliculate, apically sub-callose with normal spiracles; post-petiole not quite double breadth of petiole; second segment finely and obsoletely punctate. Legs slender and pale red; anterior coxae, trochanters and apices of the hind trochanters white, with the intermediate coxae basally infusate; hind legs with coxae, base of trochanters, tarsi and apices of tibiae and of femora, black. Wings somewhat ample, with radix and tegulae white; nervellus antefurcal and fenestrae not discreted; outer nervure of areolet obsolete. Length, 6 mm.

My tentative association of these two species as sexes of the same is entirely arbitrary and based solely upon the similarity of structure and colour; I have consequently detailed separately the descriptions and records of indigenous captures.

The female is so closely allied to *M. cretatus*, Grav., that Thomson at first (O. E. 857) thought that it was perhaps the female of that species, and Schmiedeknecht leads one to the same conclusion. The male is extremely like that of *M. arridens*, but will be easily distinguished by the points enumerated under the latter species.

♂. "Found at Darenth Wood, in June" (Stephens).—Land's End (Marquand).—I have examined the specimen attacked by *Dioctria Baumhaueri*, which Bignell took at Bickleigh, in June. It has always occurred to me early in June and occasionally again in the autumn, usually by sweeping the herbage of hedge bottoms, but sometimes on *Heracleum* flowers, at Mildenhall and Glensford, in Suffolk; Burwell Fen, in Cambs.; and Lyndhurst, in the New Forest. Tuck has sent it to me, taken at Tostock, as late as 25th September.

♀. This was introduced as British by Bridg-Fitch in their "Introductory Papers" (Entom. 1882, pp. 226 *et* 275) on the strength of a specimen in Marshall's collection taken at Bugbrooke, in Northamptonshire.

15. *leucostictus*, Grav.

Cryptus leucostictus, Gr. I. E. ii. 538; Ste. Ill. M. vii. 286; Tasch. Zeits. Ges. Nat. 1865, p. 89, ♂. *Microcryptus leucostictus*, Thoms. O. E. ix. 856, ♂ ♀.

Head nearly cubical; cheeks buccate, long and broad, with the genal costa continuous; frons strongly and sparsely punctate; ♂ with palpi piceous, the internal and part of the external orbits, the clypeus, a facial dot and centre of mandibles, white; ♀ with mouth and frontal orbits broadly red. Antennae with scape only slightly excised apically; of ♂ elongate, with the scape white, and flagellum brown beneath, with elevated lines; of ♀ with joints seven to eleven white. Thoracic spiracles small and sub-circular; ♂ with the pronotum and a dot beneath the radix white; metathorax pubescent, irregularly punctate and somewhat shining; areola broader than long, rounded in front; petiolar area discreted and reaching beyond centre. Scutellum deplanate; of ♂ always white, of ♀ usually castaneous apically; post-scutellum of ♂ also pale. Abdomen neither alutaceous nor white-marked, red, with the first segment, except more or less of its apex, black; of ♀ sub-compressed posteriorly, with the terebra shorter than half the abdomen. Legs red; hind femora incrassate, closely punctate, black; anterior tibiae spinulose; of ♀ as in *M. abdominalis*; of ♂ with coxae, trochanters, rarely the anterior femora towards their base,

hind tibiae except basally, and their tarsi, black; ♂ hind tarsi centrally, front coxae beneath and the anterior trochanters, white. Wings a little clouded; radix piceous, tegulae of ♂ white; areolet of ♀ sub-transverse. Length, 7-9 mm.

This species is similar to *M. abominator*, but the female has the antennal joints seven to eleven white, the head and areolet broader, the scutellum generally apically castaneous, the terebra shorter and the legs stouter; the ♂ is distinct in its red and basally piceous abdomen, the antennae brunnaceous beneath, with six elevated lines, in its white scutellum, post-scutellum and inner orbits.

This is a common species throughout northern and central Europe, where it has been bred from *Lophyrus pallidus* by Brischke. Stephens records it from Coombe Wood, in June, and elsewhere about London. Mr. E. A. Butler has given me a female which he recently captured at Highgate; and I took a second in the Ipswich district of Suffolk in 1894. The males standing under this name in the British Museum are nothing but small *Cryptus albatorius*, Grav.

16. nigrocinctus, Grav.

Ichneumon pedicularius, Panz. F. G. lxxxi. 13 (nec Fab.), ♀. *Mutilla acarorum*, Schr. En. 840 (nec Linn.), ♀. *Ichneumon nigrocinctus*, Gr. Mon. Ped. 35. *Pezomachus nigrocinctus*, Gr. I. E. ii. 880. *Aptesis nigrocincta*, Först. Wieg. Arch. 1850, p. 85, ♀. *Phygadeuon flavellatus*, Gr. I. E. ii. 655, ♂. *P. jucundus* Gr. lib. cit. 658; Ste. Ill. M. vii. 297; Tasch. Zeits. Ges. Nat. 1865, p. 44, ♂. *Microcryptus nigrocinctus*, Thoms. O. E. ix. 857, ♂ ♀; cf. xxi. 2383. Var. *Ichneumon sudeticus*, Gr. Mon. Ped. 37; *Pezomachus sudeticus*, Gr. I. E. ii. 884; *Aptesis sudetica*, Först. Wieg. Arch. 1850, p. 86, ♀.

Head black and nearly cubical; cheeks buccate, long and broad; frons of ♀ strongly and sparsely punctate; mandibles and palpi rufescent; ♂ with internal orbits often narrowly white and the clypeus distinctly discreted; ♀ with the latter not discreted, convex and smooth with coarse punctures, and the epistoma intumescent and rugose. Antennae with the scape but little excised apically; of ♂ sub-setaceous, elongate, with the basal joints rufescent, and scape sometimes white, beneath; of ♀ stout and filiform, with the eight basal joints entirely red, the four following white and the remainder piceous. Thorax pubescent, with the spiracles small and sub-circular; of ♂ black, with the metathorax somewhat rugose, its costae fine, areola sub-quadrate and apically incomplete; of ♀ red, strongly and coarsely punctate with the metathorax, except sometimes basally, black, with distinct apophyses, but no areae. Scutellum deplanate, of ♀ red; of ♂, together with the post-scutellum, pale stramineous. Abdomen red and pubescent, neither alutaceous nor apically white; petiole elongate and post-petiole nearly twice longer than broad, only slightly explanate, slender and sub-glabrous, with a few sub-obsolete punctures; of ♂ with segments six to the apex, usually base of the first and apex of the fifth, of ♀ apically sub-compressed, with the fourth and apical half of the third segments, black; terebra somewhat longer than the basal segment. Legs red, with apices of the stout and closely punctate hind femora and tibiae more or less infuscate, their calcaria whitish; anterior tibiae spinulose; ♂ with coxae, trochanters and the hind tarsi, black. Wings sub-hyaline; radix and stigma whitish, former in ♀ red; wings of ♀

rudimentary, not reaching apex of metathorax and somewhat densely clothed with elongate and piceous setae. Length, 3-8 mm.

Of Gravenhorst's two male varieties, the first has the coxae and trochanters mainly red or flavescent, with the areola apically incomplete, and the second has the anterior femora externally infusate; *flaveolatus* is another male, differing only in the antennae being somewhat stouter, the metathoracic costae stronger, a white callosity beneath the radix, segments two to four basally black, the following being black, with rufescent apical margins, and the post-petiole canaliculate.

This species may be known by the female's squamiform wings, which extend only to the metathoracic spiracles, tricoloured antennae, and very distinctive coloration. The antennae of the male are nearly longer than the whole body, generally pale beneath, with obsoletely elevated lines; its scutellum and post-scutellum are citrinous, and the smoothly shagreened and shining frons, mesonotum and upper mesopleurae are also distinctive; the base of the anterior legs is variable in colour.

There can, I think, be little doubt that *Aptesis sudetica* is no more than a small form of the present species, as was proposed by Förster:—

Head black, palpi yellow; mandibles red, apically black; clypeus and centre of face above it, as far as the base of antennae, also red. Punctuation strong, especially on the vertex, interstices between the punctures smooth; only the face centrally distinctly rugose, punctate. Antennae tricoloured, one to five red-yellow, eight to eleven yellowish-white, the remainder brown. Thorax strongly and somewhat closely punctured and pubescent; pro- and meso-thorax yellow, also the scutellum; metathorax darker, either red or red-brown, or the slope and the sides over the intermediate coxae infusate; transverse ridge centrally obsolete, laterally strongly dentate. Abdomen very finely and diffusely punctate and pubescent, the hairs rather long; red-yellow, segment three centrally brown, basally and laterally red-yellow, fourth also brown, with yellowish sides, and the posterior margin also lighter. Terebra at least as long as the first segment, if not slightly longer; basal segment not tuberculate, gradually but not strongly widened from base to apex, apically rather broad. Legs red-yellow, hind femora apically almost imperceptibly infusate, apex of hind tibiae brownish.

This beautiful species is by no means uncommon throughout the whole year. The females are often found hibernating in moss in the winter, and may be swept from herbage in April and September; and occasionally beaten from bushes, up which they doubtless run to approach their victims, in May. The males may also be beaten from the undergrowth in woods, but are more usually taken flying in the sunshine upon hot days, and upon the flower-tables of *Heracleum* and *Angelica*. I have never found the female between 1st May and 21st September; while the male has only occurred to me between 12th June and 17th September. Marshall bred the female from *Hybernia defoliaria*, and it has been taken at Blandford, in Dorset (P. Cambridge), Carlisle (Day), Birmingham (Bradley), Wicken Fen, in Cambs., with *Myrmedonia collaris*, in a nest of *Myrmica laevinodis* (Donisthorpe), Tostock (Sladen), Snarehole and Knowle (W. Ellis), Felden, in Herts. (Piffard), Giffnock and Ayr, in Scotland, in March (Dalglish), Hillend, Edinburgh (Evans), Whauphill, in Wigtownshire (Gordon), Chatham and Huntingfield (Chitty), the Lake district

(Bowdler), Wittersham, Kent, in flood refuse (Bennett), Guestling, near Hastings (Bloomfield); and it has occurred to me at Bentley Woods, Bramford chalk-pits, and Brandon, in Suffolk. The male is recorded, not very commonly, about London (Stephens), Maldon, in Essex (Fitch), Hastings district (Hast. List); I possess it from Greenings, in Surrey (W. Saunders), Kirknewton, near Edinburgh (Evans), Freshney Bogs, near Grimsby (Thornley), West Malvern (Tomlin), Benacre Broad and Tostock, in Suffolk (Tuck); and have taken it at Barton Mills, Mildenhall, Tuddenham Fen, Beccles, Henstead, Claydon bridge, and Bentley Woods in the same county, as well as at Gosfield, in Essex, and several times at Lyndhurst, in the New Forest. Both sexes have been captured at Shere, in Surrey, by Dr. Capron, in Devon, by Bignell, and about Norwich, by Bridgman. Mr. Bradley has drawn attention to the similarity of this female to that of the fossorial *Myrmosa melanocephala* (Birmingham Ent. Soc., 21st Nov., 1898). The only British example of the variety *sudeticus* was taken by me at the roots of *Aira caespitosa*, in the Bentley Woods, on 13th March, 1904; it differs from the type form in very little but colour, the narrower and more convex abdomen and post-petiole, and smaller size.

17. *cretatus*, Grav.

Phygadeuon cretatus, Gr. I. E. ii. 652; Tasch. Zeits. Ges. Nat. 1865, p. 30, ♂; cf. Kriech. Ent. Nachr. xviii. p. 364. *Microcryptus cretatus*, Thoms. O. E. ix. 856, ♂; lib. cit. xiv. 1532, ♀. (?) *Phygadeuon facialis*, Gr. I. E. ii. 656; Tasch. Zeits. Ges. Nat. 1865, p. 31, ♂.

Head nearly cubical, with cheeks buccate, long and broad; frons strongly and sparsely punctate, clypeus distinctly produced apically in the centre; of ♀ as broad as the thorax, glabrous and not narrowed behind the eyes, black, with the facial orbits and the cheeks broadly rufescent, genal costa inflexed and not elevated, clypeus with the palpi and stout mandibles pale red; of ♂ with mouth, clypeus, cheeks, the internal orbits, a facial and vertical dots, white. Antennae with the scape only slightly excised apically; of ♂ elongate and setaceous, with the basal joints rufescent, and the scape sometimes white beneath; of ♀ filiform, brown, with joints eight to eleven white. Thoracic spiracles small and sub-circular; ♂ with pronotum and a callosity beneath the radix white; metathorax in both sexes short, with the petiolar area reaching nearly to the base, areola sub-obsolete, basal area quadrate and well-defined. Scutellum deplanate and, with the post-scutellum, pale in ♀ and white in ♂. Abdomen neither alutaceous nor white-marked; of ♀ sub-compressed posteriorly, red, with the petiole smooth, not carinate, basally black, terebra half the length of the abdomen; of ♂ slightly narrower than the thorax, oblong-ovate, deplanate, black, with the second and third and the apical margins of the following segments red, post-petiole red and quadrate. Legs red; hind femora incrassate and closely punctate, anterior tibiae spinulose; coxae, trochanters, hind tarsi, apices of their tibiae, and in the ♀ all the femora basally, black. Wings hardly clouded; radix and tegulae of ♂ white; areolet broad pentagonal. Length, 7 mm.

The ♂ has the often indistinct vertical dots as in *M. abominator*, but differs from it in its shorter antennae, which are paler beneath, in its white pronotum, tegulae, scutellum, post-scutellum, internal orbits, face

and mouth, in its transverse and rufocastaneous second and third segments, and in the conformation of the petiolar area. The ♀ differs from all its allies in the pale-marked face, scutellum and post-scutellum; and both sexes are abundantly distinct in the apically produced clypeus, which in the ♂ takes the form of a tooth and in the ♀ of a spine.

I know of no records of this species, which was introduced as British by Marshall in 1870, on the strength of three males from Leicester; it appears to be not very rare with us, and widely distributed on the Continent, where Gravenhorst took it in September. The only sex I have captured is the male, while staying with the late Mr. Alfred Beaumont at Gosfield, in Essex, in July, 1902, and on *Angelica* flowers at Barton Mills; Tuck has found it at Aldeburgh and W. Saunders at Greenings. The only female I have seen was taken by Chitty at Catterick Bridge, near Richmond, in Yorkshire, in the autumn of 1889.

18. *larvatus*, Grav.

Phygadeuon larvatus, Gr. I. E. ii. 662; Ste. Ill. M. vii. 297; Tasch. Zeits. Ges. Nat. 1865, p. 33, ♂.

Head black, with mouth, clypeus, facial spot, and the internal orbits broadly, white; the clypeus narrow and discreted, apically produced into an obtuse point. Antennae incrassate and setaceous, with scape white beneath. Thorax black, with grey pubescence; two dots at the radix, and two upon the scutellum, white; metathorax rugulose, with complete areae; areola hexagonal, not longer than broad, with its angles obtuse; apophyses very small. Abdomen stout, somewhat narrower than the thorax; black, with segments two, three, and the basal half of the fourth, red; basal segment short and broad, gradually explanate towards the sub-intumescient apex, carinate, with no tubercles; post-petiole quadrate, canaliculate and red-margined; the three following segments equilateral, the second smooth. Legs red; the anterior paler, with the coxae and trochanters white; hind pair with the calcaria white, and the coxae, apices of the trochanters, of their tibiae and of femora, black, their tarsi infusate. Wings slightly clouded; radix and tegulae white. Length, 8 mm.

This male, which appears allied in its produced clypeus to *M. cretatus*, is not placed by Thomson; Gravenhorst draws attention to the convex and stout abdomen with its broad and short petiole. Might it not be sought for among the sub-petiolate *Tryphoninae*?

Stephens first noticed it in Britain, uncommonly about London, in June; and it is recorded from Battle, in "The Natural History of Hastings."

19. *basizonius*, Grav.

Phygadeuon basizonus, Gr. I. E. ii. 748, ♀. *P. pteronorum*, Hart. Jahresb. 1837, p. 273; Ratz. Ichn. d. Forst. i. 145; ii. 125; Tasch. Zeits. Ges. Nat. 1865, p. 46, ♂ ♀. *Microcryptus basizonius*, Thoms. O. E. ix. 863, ♂ ♀. Var. *Cryptus varicolor*, Gr. I. E. ii. 603; *P. pteronorum*, var. 2, Tasch. Zeits. Ges. Nat. 1865, p. 46, ♂. (?) Var. *P. abominator*, var. 1, Gr. I. E. ii. 727; *P. profligator*, var. 5, Grav. lib. cit. 732; *P. pteronorum*, var. 3, Tasch. Zeits. Ges. Nat. 1865, p. 46, ♂; (?) *P. commutatus*, Ratz. Ichn. d. Forst. ii. 125, ♀.

Head with cheeks buccate, clypeus narrow and discreted; ♀ with eyes sparsely pubescent and frons finely punctulate; ♂ with facial orbits broadly white. Antennae of ♂ setaceous, with scape testaceous beneath

and shorter than the post-annellus ; of ♀ filiform and infusate, with scape ferrugineous beneath, basal flagellar joints red, the sixth infusate and the five following white above. Thorax immaculate ; metathorax short, coarsely alutaceous, its notum bicostate ; petiolar area broad, excavate, and reaching beyond the centre ; spiracles circular ; ♀ with the mesopleurae rugose and costulae wanting. Scutellum of ♀ black, of ♂ generally more or less white. Abdomen smooth, black ; segments two and three, the apex of the first, and in ♀ the base or whole of the fourth, dark red ; seventh of ♀ apically white ; post-petiole deplanate, tuberculate and carinate, of ♂ subaciculate and nearly parallel-sided, of ♀ smooth, strongly explanate and transverse ; second segment glabrous, with the spiracles some distance from the lateral margin ; terebra hardly half the length of the abdomen, with the spicula stout and straight. Legs red ; trochanters and coxae black, or in ♀ mainly red ; hind tarsi and apices of their tibiae and of their femora, black ; tibiae basally white-banded and, especially the anterior, spinulose. Wings somewhat clouded ; radix and tegulae white, the latter in ♀ ferrugineous. Length, 5-8 mm.

The variety *varicolor* has the scutellum and anus entirely black, the fourth segment with base and sides red, and the tegulae infusate ; the variety *abdominator* cannot be ascribed to this species (from which it differs widely in having the radix and tegulae alone white, with the hind femora entirely and the intermediate beneath black) without considerable doubt, and is but tentatively so treated here.

This species occurs throughout northern and central Europe ; Taschenberg says it is a common parasite upon *Lophyrus pini*,¹ having regard, no doubt, to the hundreds of specimens bred from this host by Prof. Ratzeburg in Germany. The latter also bred it from *L. rufus*, and Brischke adds *L. similis* as one of its victims. It is, however, in its turn preyed upon by another Cryptid, *Hemiteles areator*, Panz. Though this species has stood in the British Catalogue since 1872, I can instance the occurrence of but a single male, of the variety *varicolor*, which I took upon the flowers of *Mentha hirsuta*, in Dodnash Woods, near Ipswich, on 20th August, 1896.

20. *sericans*, Grav.

Phygadeuon sericans, Gr. I. E. ii. 702 ; Tasch. Zeits. Ges. Nat. 1865, p. 47, ♂. *Microcryptus sericans*, Thoms. O. E. ix. 864, ♂ ♀.

Head black, somewhat stout ; cheeks buccate, clypeus discreted and apically truncate, eyes of ♀ sparsely pubescent. Antennae of ♂ rather longer than half the body, with the postannellus longer than scape. Thorax immaculate ; metathorax short, its notum in ♂ regularly and completely areated, with the areola sub-quadrate and longitudinally rugose ; petiolar area excavate, reaching beyond the centre and, in ♂, discreted. Scutellum black. Abdomen sub-sericeous, black, with the second and third segments, the apex of the first centrally, and sometimes the whole of the fourth, dark red ; petiole gradually dilated towards the apex, with distinct carinae ; post-petiole deplanate, rectangular and aciculate, of ♀ transverse ; second segment sub-longitudinally and feebly rugulose, with

¹ Westwood (Mod. Intr. ii. 109) says Hartig gives fifteen spp. of *Ichneumonidae* as preying upon *Lophyrus pini*, and (p. 90) refers "Hartig. Die Aderflügler Deutschlands, Erst. Band. Die Familien der Blattwespen und Holzwespen, Berlin, 1837." This I have not seen.—C.M.

the spiracles some distance from the margins; terebra shorter than half the abdomen, with the spicula stout and straight. Legs elongate, sub-sericeous, red; coxae, trochanters, hind tarsi, with the apices of their tibiae and of their femora, black; anterior tibiae spinulose. Wings slightly clouded; radix ferrugineous, tegulae black. Length, 9-11 mm.

This species is very like *M. basizonius*, and was thought to very probably be a variety of it by Taschenberg; it may, however, be distinguished by its larger size and greater breadth; the ♀ by the broad black apices of its hind femora and black markings beneath the anterior, as well as by the shorter calcaria and terebra; the ♂ has the head and tegulae entirely black; moreover, the tibiae are not basally white.

It appears to be very little known and has not been bred; I can instance no indigenous records, though it was introduced as British by Marshall in 1870. On the Continent it has a wide range in the central districts, extending to Sweden; and, in Germany, Gravenhorst found it frequenting *Aphides*, in August.

21. *tricinctus*, Grav.

Cryptus tricinctus, Gr. I. E. ii. 570; Tasch. Zeits. Ges. Nat. 1865, p. 88, ♂.

Head black and somewhat broad, though contracted, behind the prominent eyes; frons and occiput shining and very finely punctate, the latter centrally sub-foveate basally, the former centrally canaliculate throughout, with orbits immaculate; face closely punctate and somewhat dull, with an epistomal mark, and the convex, apically mutic clypeus (often confluent), cheeks, lower facial orbits triangularly, and mouth except apices of the strongly punctate mandibles, stramineous. Antennae as long as the body, somewhat stout, black, with scape hardly longer than half the post-annellus and entirely stramineous beneath. Thorax and scutellum immaculate, basal fovea of the latter crenulate; mesonotum obsoletely punctate and strongly nitidulous, with the weak notauli extending beyond its centre; metathorax irregularly, though not coarsely punctate and not centrally convex, with the lateral costae weak, and costulae wanting; areola well-defined, hexagonal and confluent with the basal area; petiolar area not elongate, finely discreted and basally truncate; apophyses obsolete and spiracles sub-circular. Abdomen elongate-clavate, thickly and very finely punctate, with white pubescence, lending a dull appearance throughout; black, with the extreme apex of the first, apical half of the second, of the third, and usually of the fourth, segments, clear red; basal segment linear, parallel-sided, post-petiole sub-convex and very obsoletely punctate, neither explanate nor canaliculate; second segment with thyridii circular, red and conspicuous. Legs elongate, red, with apical joint of all the tarsi infusate; anterior coxae black and trochanters white; hind coxae, trochanters, tibiae, except basally, and tarsi black, these last with the fourth, third and apical half of the second joints clear white. Wings hyaline and not narrow; areolet entire and somewhat broad; stigma piceous, radix and tegulae white; nervellus sub-opposite and intercepted far below the centre. Length, 7-8 mm.

In its elongate legs, antennae and abdomen, as also the white tarsi, it resembles *M. perspicillator*, from which the form of the metathoracic spiracles renders it distinct; Taschenberg places it next to *M. leucostictus*. Thomson (O. E. v. 524,—followed by Schmiedeknecht) queries the

synonymy of this species with his *Cratocryptus opacus*, but the generic characters are quite distinct, and he evidently did not know the insect, which has the hind femora hardly perceptibly nigrescent apically, and the pale orbits do not extend up as far as the antennae. Brischke has described what he thought to be this species (Schr. Ges. Nat. Danz. 1879, p. 338), but he says the hind tarsi are not white, the intermediate femora are basally black, and the coloration of the central segments, which appears to me a very distinct and constant character, is quite different.

This species has not before been noticed in Britain, and does not appear to have been recognized on the Continent since first described in 1829.

I took a fine specimen flying in the sunshine, in the Bentley Woods, near Ipswich, on 4th June, 1901; and there are four others in Dr. Capron's collection, probably from the neighbourhood of Shere, in Surrey. Gravenhorst only knew one male, taken in June, in Hercynia.

22. erythrinus, Grav.

Cryptus erythrinus, Gr. I. E. ii. 621; Ste. Ill. M. vii. 294, ♀. *Phygadeuon erythrinus*, Tasch. Zeits. Ges. Nat. 1865, p. 52, ♀. *C. lacteator*, Gr. I. E. ii. 618, excl. ♀. *P. lacteator*, Tasch. Zeits. Ges. Nat. 1865, p. 50, excl. ♀. *Microcryptus erythrinus*, Thoms. O. E. ix. 860, ♂ ♀.

Head black; clypeus discreted and apically truncate-emarginate; epistoma hardly convex; frons smooth, sub-pubescent, its orbits immaculate; ♂ with the facial orbits more broadly below, cheeks, clypeus, and the mouth, excepting a part of the mandibles, white. Antennae of ♂ with the scape red beneath; of ♀ stout, filiform, hardly longer than half the body, the scape and basal joints red at least beneath, the third not twice longer than broad and the eighth to the thirteenth white. Thorax immaculate; metathorax rugulose and, in ♂, with complete areae, petiolar area not reaching beyond the centre and discreted; apophyses wanting or obsolete; spiracles circular; areola longer than broad, hexagonal-quadrate; mesosternal sulci elongate, nearly entire, inflexed. Scutellum black. Abdomen red, with the second segment very finely alutaceous, the fifth to seventh, except their white apical margins and the base of the first, black; of ♀ oblong-ovate, as broad as the thorax, with the seventh segment broadly white in the centre and the post-petiole deplanate, sub-quadrate, a little curved laterally, and closely punctate; post-petiole of ♂ elongate, not laterally curved, somewhat distinctly canaliculate and finely alutaceous; terebra as long as the abdomen, reflexed. Legs, including the coxae and the ♀ tarsi, red; of ♂ with the hind tarsi, and both sexes with apices of their tibiae often somewhat infusate. Wings a little clouded and narrow; radix and tegulae white, latter in ♀ rufescent. Length, 5–8 mm.

From its allies this species may be distinguished by its smooth forehead, finely rugulose mesopleurae, which are smooth above, the terebra which is nearly longer than the abdomen and obviously recurved; and in the ♂ by the oblong-quadrate areola, the distinct costulae which are wanting in the ♀, and in its white-marked anus.

This species is the type of the genus, according to Ashmead.

[It appears probable that the *Phygadeuon lacteator*, Grav., standing in our lists, is no more than the ♂ of the above species, the ♀ of which con-

stitutes *Microcryptus lacteator* of Thomson and differs from that of *M. erythrinus* only in its buccate cheeks, closely punctate frons, black antennae, of which joints three to four are red and eight to twelve white, in its entirely red basal segment, feebly canaliculate post-petiole, infuscate front coxae and trochanters and apices of hind femora, and in the radial nervure, which is longer apically than basally.

This female certainly requires confirmation before it be admitted into the British fauna, although Bridgman records "*Phygadeuon lacteator*," without indicating the sex, from Earldam and Brundall in July and August, as also has Bignell from Bickleigh in the middle of June; it is also doubtfully recorded from Battle, in Sussex, in the Hastings List.]

This is not an uncommon species on the Continent, though it has been but rarely recorded from Britain. Stephens says the female used to be uncommon about London in June; in Norfolk, Bridgman took it at Norwich and Horning Ferry, and Thouless in Foxley Wood; Bignell has captured it at Bickleigh, in Devonshire, early in September; and I have specimens from both Dr. Capron, of females from Shere, and Beaumont, of males from Blackheath, Harting and Woking in the middle of June and of July. The latter sex seems much the commoner; I have taken it at Barton Mills, in June, and Wilson Saunders at Cophthorne Common, in Surrey, in August. Chitty has taken a female in Yorkshire, in September.

23. *sperator*, Müll.

Ichneumon sperator, Müll. Prodr. 157, ♂. *Phygadeuon sperator*, Gr. I. E. ii. 683; Ste. Ill. M. vii. 299; Tasch. Zeits. Ges. Nat. 1865, p. 50, ♂. *Microcryptus sperator*, Thoms. O. E. ix. 861, ♂ ♀. (?) *Phygadeuon fumator*, var. 4, Gr. I. E. ii. 691, ♂.

Head black, epistoma hardly convex; frons shining and sub-glabrous, its orbits immaculate; ♂ clypeus discreted, apically truncate and its mandibles, palpi and facial orbits, white. Antennae of ♂ sub-setaceous, nearly as long as the body, with the scape apically or entirely white beneath; of ♀ tricoloured, with the fifth joint sub-transverse. Thorax immaculate; metathorax somewhat shining, ♂ areola hexagonal and apophyses sub-obsolete; petiolar area usually discreted and not reaching beyond the centre; metapleurae sub-obliquely transcostate; spiracles small and circular; mesopleurae coriaceous, their sulci elongate, nearly entire and inflexed. Scutellum black. Abdomen red, with the second segment very finely alutaceous and in ♀ transverse; of ♂ parallel-sided and narrower than thorax; segments five to seven, and the whole or basal half of the first, black, with the central ones of the ♂ sometimes dorsally infuscate; seventh and sometimes also in ♀ the sixth white-margined; petiole of ♀ elongate, with weak carinae, spiracles prominent, and the puncturation close and somewhat irregular; terebra elongate and reflexed. Legs, including the ♀ coxae and tarsi, red; of ♂ somewhat slender, with the coxae and trochanters badius, the hind tarsi, apices of their tibiae and most of their femora, black, and their calcaria white. Wings sub-hyaline; radix, and the ♂ tegulae, white. Length, 5–8 mm.

In most of the ♂ ♂ I have examined the pronotum is anteriorly white in the centre.

This species is similar to *M. arridens* and *M. erythrinus*, but will easily be distinguished by the sub-transverse fifth antennal joint of the ♀, its

shorter and very densely alutaceous second to fourth segments, coriaceous mesopleurae and smooth frons, as well as by the radius being hardly longer apically than basally; the ♂ has the legs red, with the hind tarsi, apices of their tibiae and femora, and all the coxae and trochanters black, the last being sometimes red-marked.

This is by no means an uncommon species with us, though I have not seen the female and nothing appears to be known regarding its economy. It occurs in May, August and September, on umbelliferous flowers (Gravenhorst), about London, at Darenth Wood, etc. (Stephens), Felthorpe, in Norfolk (Bridgman), Horrabridge, in Devon, at the beginning of June (Bignell), Guestling, near Hastings (Bloomfield), New Forest (Miss Chawner), Grovely Wood, near Salisbury (Marshall), Tostock, in Suffolk, in July (Tuck). I have taken it flying in Lyndurst gardens, in the middle of August; at Rockland Broad in Norfolk, in June, when W. Saunders found it at Greenings, in Surrey; and on the flowers of *Angelica sylvestris* at Barton Mills, in Suffolk, at the end of August.

24. *graviceps*, Marsh.

Aptesis graviceps, Marsh. E.M.M. v. p. 155, ♀.

Head very large, twice broader than thorax and finely punctulate, black. Antennae nigrescent, with the three or four basal joints testaceous, and the seventh and eighth white above. Thorax finely punctulate, immaculate; metathorax with distinct and punctulate areae; basal area small and short; areola hexagonal, basally narrow, widest centrally and gradually contracted thence to its apex; costulae distinct. Abdomen hardly punctulate, nitidulous; black, sometimes with the apex of the first segment and disc of the second more or less badius; basal segment finely punctulate, shortly bicarinate, with two longitudinal lateral furrows; apically glabrous and thrice broader than the petiole; spiracles central and inconspicuous; terebra as long as the basal segment, fulvous, with the valvulae testaceous and apically black. Legs entirely testaceous. Wings reaching beyond apex of metathorax, sub-infusate, with the nervures becoming apically obsolete; stigma triangular, pale fuscous; areolet transverse, sub-obsolete, irregular or quadrate, with the lower nervure incomplete. Length, $2\frac{1}{2}$ mm.

The Rev. T. A. Marshall says that in one specimen the radial cell is closed on the right side and incomplete on the left; and that in another individual the areolet is obsolete and reduced to a punctiform knot, which is combined with rather shorter wings.

The tricoloured antennae appear to leave no doubt that this somewhat anomalous insect should be placed in the present genus, although the remarkable conformation of the head corresponds rather with certain species of *Phygadeuon*. It has not yet been noticed on the Continent and finds no place in the most recent European enumeration of the *Cryptinae*.

Four specimens of this very distinct species were captured in a wood near Milford Haven, by Marshall, during August, 1868; and it does not

appear to have been since met with, though there is another female in his collection from Nunton, in Wilts. (in Brit. Mus.).

25. *brachypterus*, Grav.

Ichneumon abbreviator, Panz. F. G. lxxi. 17 (nec Fab.), ♀. *I. brachypterus*, Gr. Mon. Ped. 29. *Pezomachus brachypterus*, Gr. I. E. ii. 876; Suppl. i. 715. *Aptesis brachyptera*, Först. Wieg. Arch. 1850, p. 91, ♀. *Phygadeuon jejulator*, var. 2, Gr. I. E. ii. 717, ♂. *Microcryptus brachypterus*, Thoms. O. E. ix. 864, ♂ ♀.

♂. Head black, with the mouth and internal orbits, often also nearly the whole face, white; frons obsoletely punctate; clypeus immaculate and apically sub-produced in the centre. Antennae infusate; scape testaceous beneath, flagellum with several raised lines. Thorax immaculate; costae obsolete, spiracles circular. Scutellum black. Abdomen elongate-ovate, narrower than thorax; black, with segments two to four, apex of the first and sometimes base of the fifth, red; post-petiole sub-quadrate, canaliculate. Anterior legs pale red, with the coxae and trochanters black; hind ones black, with the basal half of the femora and the tibiae, except apically, red. Wings normal, sub-hyaline; stigma pale piceous, radix and tegulae white.

♀. Head black, with the cheeks and mandibles castaneous; frons deeply and diffusely punctate, the vertex more finely. Antennae tri-coloured; the five basal joints fulvous, the seventh and eighth white and the remainder infusate. Prothorax nigrescent or rufescent; mesonotum red, with a broad black central vitta; mesopleurae rufescent, strongly and deeply punctate; metathorax black, basally rufescent; meta-much shorter than meso-notum, with the petiolar area very broad and basally entire; areola weakly defined, apophyses obtuse and lateral costae distinct. Scutellum dark red. Abdomen black, with the four basal segments red and the anus whitish; first segment laterally infusate, sometimes longitudinally canaliculate. Legs entirely red. Wings reaching to the apex of metathorax. Length, 3-6 mm.

The conformation is very like *M. basizonius* in the ♀, which differs from *M. micropterus* in the ferrugineous thorax, stout spicula sub-buccate cheeks and broader, sub-transverse post-petiole. The ♂ only differs from the preceding in the partly pale frontal orbits, more broadly white face, the evidently produced clypeus, red anterior femora of which the hind ones, together with the apices of their tibiae, their tarsi, coxae and trochanters, are entirely black; the ♂ resembles that of *M. abdominalis* but the anterior femora are entirely fulvous and the metathoracic costae more obsolete.

The male is said to occur throughout a wide Continental area in May and June, but I have heard of no British records. The female is not common with us, though Dale records it to be so at Glanvilles Wootton, and Bignell took it at Exeter, early in September; only two examples, found by Piffard, at Felden, in Herts., have come under my observation. I have, however, taken males at Huntingfield, near Faversham, and at Assington Thicks and Farnham, in Suffolk. Beaumont, too, took it at Blackheath, in August.

26. *micropterus*, Grav.

Ichneumon micropterus, Gr. Mon. Ped. 26, ♀. *Pezomachus micropterus*, Gr. I. E. ii. 879. *Aptesis microptera*, Först. Wieg. Arch. 1850, p. 89, ♀. *Physadeuon jejunalor*, var. 1, Gr. I. E. ii. 717; cf. Tasch. Zeits. Ges. Nat. 1865, p. 46, ♂. *Microcryptus micropterus*, Thoms. O. E. ix. 865, ♂ ♀.

♂. Head black, with the mouth and facial orbits white; frons and clypeus immaculate, latter apically broadly rounded and not centrally produced, the former obsoletely punctate. Antennae infusate; scape testaceous beneath, flagellum with several raised lines. Thorax immaculate; costae obsolete, spiracles circular. Scutellum black. Abdomen elongate-ovate, narrower than the thorax; black, with segments two to four, apex of the first and sometimes base of the fifth, red; post-petiole sub-quadrate, canaliculate. Anterior legs pale red, with coxae black and trochanters white; hind ones black, with the basal half of the femora and the tibiae, except apically, red. Wings normal, sub-hyaline; stigma pale piceous, radix and tegulae white.

♀. Head black, with the palpi and mandibles red, latter apically black; face finely rugulose, closely and strongly punctulate, dull; temples shining and strongly punctate. Antennae tricoloured; the six basal joints red, the next four white and the remainder piceous. Thorax black; mesonotum strongly but not closely punctate throughout; metathorax rugose, smoother basally; areola distinct, petiolar area discreted and basally entire; apophyses prominent and obtuse. Scutellum black and punctate. Abdomen finely and diffusely pubescent; black, with segments two and three entirely, apex of the first and sides of the fourth and fifth red, anus whitish; basal segment gradually explanate, apically broad, with the basal half centrally canaliculate and the spiracles not prominent; terebra as long as the first segment. Legs red; coxae and trochanters paler, apices of the hind tibiae and of their femora infusate. Wings hardly reaching beyond the apex of the metathorax. Length, 3-6 mm.

The female differs from *M. brachypterus* in its shorter wings, longer terebra, more slender spicula, longer post-petiole and sub-infusate head and thorax; the ♂ also is very similar to the last species in colour, but the clypeus is apically rotundate and not produced centrally, its frons is immaculate, face less broadly white, the vertex slightly narrower, the anterior trochanters white and the hind femora more narrowly black.

This species is widely distributed on the Continent and probably of rather more frequent occurrence with us than the next, though by no means common. The female has been found in the nests of *Formica rufa* (Ent. Ann. 1861, p. 41); in August, at Bickleigh, in Devon (Bignell); at Guildford, in 1879 (Capron, Entom. 1880, p. 88); and Greenings, in Surrey (W. Saunders); I have two or three specimens taken at Felden, in Herts., by Piffard, and one found at Abinger Hammer, in Surrey, by Butler, in August, 1900. The male appears rarer and is only recorded by Bridgman as common in Norfolk, where he took no female; I have taken it at Hursthill and Pondhead, in the New Forest, early in August; in Wicken Fen, in Cambs.; in the Bentley Woods, near Ipswich; and once by sweeping brackish reeds at Easton Broad, in Suffolk, on June 3rd, 1905.

The female has once or twice occurred to me in early June, at Belstead, near Ipswich, running swiftly, with waving antennae, over the leaves of *Arctium minus*, especially at sundown.

27. *labralis*, Grav.

Phygadeuon labralis, Gr. I. E. ii. 710; Tasch. Zeits. Ges. Nat. 1865, p. 46, ♂; cf. Brisch. Schr. Nat. Ges. Danz. 1879, p. 342. *Aptesis vestigialis*, Först. Wieg. Arch. 1850, p. 90. *Microcryptus vestigialis*, Schm. Opusc. Ichn. ix. 653, ♀.

♂. Head, with labrum, the distinctly discreted clypeus and often the palpi, white. Antennae half as long again as the body, with the scape sometimes flavescent beneath. Thorax and scutellum black; metathorax finely alutaceous with sub-complete areae; areola laterally straight and not separated from the basal area; spiracles circular. Abdomen oblong-clavate and narrower than the thorax; black, with segments two to four, and an apical mark on the first, red; basal segment slender, with weak carinae and normal tubercles; post-petiole gradually explanate, foveate and a little broader than the petiole. Legs slender red; coxae, trochanters, and sometimes the intermediate femora basally, black; hind legs with the tarsi, apices of the tibiae, and the femora above or entirely, black. Wings somewhat ample, hyaline; radix flavescent and tegulae infusate. Length, 7-9 mm.

The similarity of this male to *Phygadeuon jejunator*, var. 1, Grav., leads one to expect that it is the male of some *Aptesis*, but no analogy has until now been suggested. Schmiedeknecht places it as an insufficiently described species of *Phygadeuon*, but the white clypeus and scape, together with its relationship with *M. micropterus*, certainly indicate its position in the present genus. From the last-named species it differs in its pale clypeus, immaculate orbits, sub-complete metathoracic costae, infusate tegulae and black front trochanters.

♀. Head black, the palpi red-yellow, the mandibles red with black apex; the whole face with the clypeus and the cheeks also red, only above and round the clypeus slightly brownish; the inner orbits to above the antennae usually red. The whole face rugose, also the temples, the latter however somewhat more finely; but the clypeus, the cheeks and the vertex, with the occiput, smooth. Antennae with joints one to eleven red-yellow, eight to eleven sometimes paler, the rest brownish. The thorax red-yellow, the mesothorax, like the head, rather distinctly but somewhat diffusely punctate; the petiolar area of the rugose metathorax surrounded by a ridge distinct throughout and more prominent laterally; inside this ridge are two costae which converge downwards whereby an area postero-media is produced. At the base all trace of costae is wanting, and at the sides the costulae of the areola spiraculifera are very indistinct. The wings extend a little beyond the apex of the metathorax, tegulae red-yellow; nervures yellow, at most feebly red-yellow, apical cells incomplete. Abdomen finely and somewhat diffusely punctured, smooth, pubescence comparatively long; segments one to three red-yellow, the following brown; terebra with feebly brownish sheaths, rather longer than the first segment, which is without prominent tubercles, gradually but not strongly

widened from base to apex. Legs red-yellow, apex of hind femora and tibiae very feebly infusate. Length, 5 mm.

My tentative association of these sexes is, I believe, no more arbitrary than many of Professor Thomson's; and, working purely upon circumstantial evidence and the similarity of structure, the choice of ♀ lies between *Aptesis vestigialis* and *A. gravis*, of which the latter is at present unrecognized on the Continent.

Phygadeuon labralis was introduced as British by Marshall in 1870, but I can find no specific records in current literature. Gravenhorst took it in June, and Schmiedeknecht indicates a wide distribution in Europe, though he has altogether omitted that of *A. vestigialis*, which was first found in Britain by Champion, who bred it from *Colophora solitariella*, together with a small ♂ *Limneria*, upon which it was perhaps parasitic (cf. Entom. 1881, p. 139). Bridgman remarks, concerning this specimen (Trans. Ent. Soc. 1881, p. 155), that it bore no trace of red at the inner orbits, the lines on the metathorax were scarcely perceptible, and that the antennae had the five basal joints entirely, with the two following partly, castaneous, the eighth to eleventh white above but not below.

I have only seen four British specimens, all males, captured by Charbonnier, at Lynmouth, in July; by Piffard, at Felden in Herts.; and by myself by sweeping a hedge-bottom at Lakeheath, in June, and upon the flower of *Angelica sylvestris* at Lackford Bridge, in Suffolk, towards the end of August. These specimens vary in size from 5½ to 7 mm.; the antennae are not or hardly as long as the body, the hind femora are sometimes pale, the basal segment is determinately canaliculate centrally throughout and laterally margined, but with the carinae obsolete. The labrum is always pale and the face immaculate, though the clypeus, mandibles, palpi and anterior coxae are variable in colour. The thorax and oblong-clavate abdomen are strongly pubescent, with the somewhat dull second segment centrally or basally fasciated or spotted with black.

ACANTHOCRYPTUS, Thomson.

Thoms. O. E. ix. (1883), 867; *Rhembobius*, Först. Verh. pr. Rheinl. 1868, p. 184 et *Phyzelus*, Först. lib. cit. p. 185.

Face of ♂ more or less, and the not centrally compressed flagellum of ♀ banded with, white. Thorax sometimes red; mesonotum strongly punctate; metathorax with large and stout apophyses; the very broad and elongate petiolar area also sometimes laterally dentate; costulae distinct, at least basally; basal area transverse, strongly convergent apically and not parallel-sided; spiracles small and circular. Scutellum deplanate, with the basal foveae usually multicostate transversely. Abdomen nearly always centrally red, very strongly nitidulous, with the first and often base of the second segment aciculate; basal segment laterally bordered throughout; terebra not elongate, its valvulae often centrally explanate. Upper wings with the radial nervure emitted from centre of the stigma, and a little longer apically than basally; discoidal cell rectangular below, with fenestrae confluent.

This is certainly a natural genus, the species of *Phyzelus* being too closely allied in their strong dentiparal spines, deeply punctate mesothorax,

broad and coriaceous petiolar area, glabrous segments and white-banded, incrassate antennae with *Rhembobius* to render either of Förster's genera valid; though the divergence of conformation of the areola, terebral valvulae, basal colour of the flagellum and their economy might enable us to consider them distinct, were it not that in *A. nigrita* the pleural apophyses and terebral valvulae are distinctly transitional.

Table of Species.

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|------|----|--|--------------------------|
| (6). | 1. | Metathorax bituberculate; areola not broader than long (PHYZELUS, Först.). | |
| (3). | 2. | Mesonotum black; dentiparal areae transcostate | 1. NIGRICOLLIS, Thoms. |
| (2). | 3. | Mesonotum red; dentiparal areae simple. | |
| (5). | 4. | Scutellar fovea transcostate; hind femora dark | 2. FLAGITATOR, Rossi. |
| (4). | 5. | Scutellar fovea simple; hind femora pale | 3. HOPEI, Morl. |
| (1). | 6. | Metathorax quadrituberculate; areola strongly transverse (RHEMBOBIUS, Först.). | |
| (8). | 7. | Abdomen and legs mainly red; lower metathoracic spine strong | 4. QUADRISPINOSUS, Grav. |
| (7). | 8. | Abdomen and legs nearly entirely black; lower metathoracic spine weak | 5. NIGRITA, Grav. |

1. nigricollis, Thoms.

Acanthocryptus nigricollis, Thoms. O. E. ix. 868, ♀. (?) *Ichneumon subtilicornis*, Gr. I. E. i. 529, excl. ♀; cf. Wesm. Mém. couron. Ac. Belg. 1859, p. 72.

♀. Head black, narrowed behind the prominent eyes; frons deplanate, smoothly and confluent punctate; epistoma and clypeus convex, latter truncately rounded and distinctly margined apically, and, with the centre of the internal orbits, apex of cheeks and the mandibles, rufescent. Antennae stout, filiform and apically obtuse; scape and three basal flagellar joints clear red, the next two sub-infusate, central three or four white and the remainder black. Thorax black, somewhat coarsely and confluent punctate throughout; areola pentagonal and not broader than long, with costulae abbreviated and the dentiparal areae transcostate; basal area narrow and hardly explanate basally; apophyses large, obtuse and sub-reflexed; petiolar area coriaceous, broad and strongly discreted. Scutellum, and more rarely the post-scutellum, dull ferrugineous with its basal fovea broad and simple. Abdomen glabrous and nitidulous throughout, with the petiole black, the fifth and sixth segments sub-infusate and the anus dull stramineous; basal segment bicarinate to beyond its centre, and laterally margined throughout; terebra rather longer than the basal segment with the valvulae linear and not acuminate apically. Legs entirely red, or with apices of the hind femora and tibiae sub-infusate; coxae and trochanters a little paler. Wings normal, slightly clouded; areolet somewhat large and parallel-sided, with the outer nervure not strong. Length, 6 mm.

♂. Head black, with the mouth and face pale flavous. Antennae shorter than the body, infusate; red, with the scape pale flavous beneath.

Thorax and scutellum entirely black. Abdomen black, with segments two, three and sides of the fourth, red. Legs red; trochanters white; anterior coxae white, hind ones, together with their tarsi, apices of their femora and tibiae, black. Wings clouded; radix and tegulae pale flavous. Length, 5 mm.

No one appears to have noticed this ♂ since it was first described by Gravenhorst and relegated to *Phygadeuon* by Wesmael (*loc. cit.*). Bridgman has placed it in his collection under the present genus, and I am quite sure that he is correct. Gravenhorst's name would have to fall in any case, and it appears advisable to tentatively treat it as the unknown ♂ of Thomson's species (*cf. Ichn. Brit. i. p. 265*).

Bridgman has, somewhat boldly, recorded the male from Heigham, near Norwich, in June (*cf. Trans. Norf. Soc. v. 613*); and the female, which is new to Britain, was sent me by Tuck, who captured a single example upon the flowers of *Angelica sylvestris*, in Finborough Park, in Suffolk, on 26th August, 1900. I also possess three females in Capron's collection, from the neighbourhood of Shere, in Surrey.

2. *flagitator*, Rossi.

Ichneumon flagitator, Rossi, Mant. ii. App. n. 83, ♀. *Cryptus flagitator*, Gr. I. E. ii. 627, *cf. i. Suppl. 705*, excl. var.; Ste. Ill. M. vii. 294, ♀. *Phygadeuon pumilio*, Gr. I. E. ii. 653; Ste. Ill. M. vii. 296; Tasch. Zeits. Ges. Nat. 1865, p. 33, ♂. *Acanthocryptus flagitator*, Thoms. O. F. ix. 867, ♂ ♀.

Head with clypeus discreted and in ♂ somewhat convex anteriorly; black, of ♀ with clypeus and a dot at the inner orbits red; of ♂ with the inner orbits, more or less of the palpi and clypeus, with nearly the whole face, white. Antennae black; of ♂ sub-setaceous with the scape white beneath, of ♀ filiform with joints two to four and the apex red, and nine to eleven white. Thorax of ♀ red, with the pronotum, a pectoral mark, the radical and scutellar regions, black; of ♂ black, with a white callosity beneath the radix; metathorax rugose with complete areae, areola hexagonal, petiolar area excavate and very divergently discreted; spiracles circular, apophyses very strong and acute; mesosternal sulcus rugulose. Scutellum with basal fovea distinctly transcarinate; of ♀ red, of ♂ as well as the post-scutellum white. Abdomen somewhat narrower than the thorax, black; of ♂ elongate, with segments two, three, apex of first and whole or the base of the fourth, testaceous; of ♀ ovate, sub-deplanate, entirely glabrous, with the two or three basal segments pale red, and the sixth and seventh apically white; petiole explanate, post-petiole of ♀ a little transverse, parallel-sided, carinate throughout and glabrous, of ♂ sparsely punctate; terebra black, half length of the abdomen. Legs black; the anterior tarsi and tibiae and apices of the front femora ferrugineous; hind tibiae and in ♂ their femora also ferrugineous basally; ♀ with hind coxae and trochanters rufescent above; ♂ with the front trochanters sometimes white. Wings normal, slightly clouded; radix and tegulae white, latter in ♀ ferrugineous. Length, 7-9 mm.

The nearly entirely red thorax and rugulose mesosternal sulcus of the ♀, and stout metathoracic apophyses of the ♂, will at once distinguish this species from all but that next described.

This species occurs throughout Europe, extending to northern Africa, and is not very uncommon in Britain. Stephens records both sexes as uncommon about London, in June, and the male in July; Tuck has taken it at Tostock, in Suffolk, in early September; and I found it on the flowers of *Angelica sylvestris* at Harkstead, in the same county, on the first of the same month, 1903. It has been bred from *Depressaria heracleana* and *D. depressella* (cf. Entom. 1882, p. 276). Dr. Capron found it at Shere, in Surrey; and Chitty in September, 1890, at Offchurch Bury, near Leamington.

[*Cryptus tyrannus*, Gr. I. E. ii. 630; Ste. Ill. M. vii. 295, ♀. *Phygadeuon tyrannus*, Tasch. Zeits. Ges. Nat. 1865, p. 48, ♀.

Head black, with the internal orbits rufescent. Antennae compressed and slightly incrassate towards their obtuse apices, half the length of the body; joints eight to twelve white and the two basal flagellar red. Thorax with mesonotum red; metathorax finely coriaceous, with incomplete areae; lateral costae extending from near the circular spiracles to the slender and acute apophyses; areola sub-pentagonal, apically trisinate; costulae and apex of basal area wanting; petiolar area discreted. Scutellum red. Abdomen glabrous and nitidulous; black, with two basal segments red, the second bearing an infusate fascia; fifth to seventh white-margined; basal segment laterally nearly straight, dorsally smooth, with inconspicuous spiracles; terebra about half length of abdomen. Legs normal and black; tarsi, anterior and base of hind tibiae, and apices of anterior femora, red. Wings clouded; radix testaceous, tegulae red. Length, 6 mm.

There is no clue to the true position of this female, whose clypeus is not described. Gravenhorst placed it in his genus *Cryptus*, because it was similar in conformation and facies to *C. minutiorius*, whence it was removed by Taschenberg on account of its stouter legs and antennae. The red thorax and stout apophyses recall certain species of *Rhembobius*, but the petiolar area is not described as quadrituberculate, nor do we know the shape of the basal area. It agrees in the costation of the metathorax very well with *Microcryptus Spinolae*, near which I had placed it, till Schmiedeknecht, in 1905, treated it as a mere variety of *flagitator*, but its incompletely areated thorax, slender and acute apophyses, apically trisinate and basally confluent areola, obsolete costulae, the coloration of the legs, the black third and darkly fasciated second segment so abundantly distinguish it that I tentatively place it under that species for the sake of convenience only, since we know it as indigenous solely from Stephens' unreliable record: "Near London, rarely in June".]

3. *Hopei*, *sp. n.*

Cryptus flagitator, var., Gr. I. E. i. Suppl. 705, ♀. (?) *Phygadeuon flagitator*, Tasch. Zeits. Ges. Nat. 1865, p. 36.

Head black, with mouth, face and the frontal orbits to the vertex, red. Antennae black, with the five basal joints, except the upper side of the scape, red; the eighth to the eleventh white. Thorax red, with the pronotum, a pectoral mark and the scutellar region, black. Scutellum red,

with its basal fovea simple and not transcarinate. Abdomen black, with the three basal segments entirely red, and the seventh alone dorsally white; terebra black and half length of the abdomen. Legs red, usually with the apices of the hind femora and tibiae, and base of the anterior trochanters, black; hind tarsi infusate. Wings normal, slightly clouded; radix sub-stramineous, tegulae ferrugineous. Length, 6-7 mm.

This female was thought no more than a variety of the preceding species by Gravenhorst, but is indicated under the name *Cryptus Hopei*, though not described, as a good species in Desvignes' "Catalogue of British Ichneumonidae in the Collection of the British Museum," 1856, p. 58. It appears to be much mixed with *R. flagitator*, from which it has never been adequately discriminated, though differing very materially in the colour of the legs and abdomen, and the sculpture of the scutellar fovea, which bears no trace of the transverse costae, so prominent in the latter species.

The two original females were captured by Hope, at Netley, in Shropshire; they still exist in the British Museum, but Desvignes' type is smothered with verdigris. Harwood records it from Essex in the Victoria History; Bridgman found it at Lakenham, Norfolk, in September; and I have seen a specimen taken by Hamm, at Shotover, near Oxford. I have only found it in the middle of summer and not, like the last species, in the autumn; on the flower-tables of *Heracleum sphondylium*, in the Bramford marshes, near Ipswich, 10th July, 1899; and in a boggy spot at Barton Mills, in Suffolk, 11th June, 1900. Both sexes of Taschenberg's species were bred from *Depressaria heracleana*.

4. quadrispinosus, Grav.

Phygadeuon quadrispinus, Gr. I. E. ii. 674, excell. varr. 1 et 2, cf. i. Suppl. 706; Ste. Ill. M. vii. 298; Holmgr. Sv. Ak. Handl. 1854, p. 55; Tasch. Zeits. Ges. Nat. 1865, p. 39, ♂ ♀. *Acanthocryptus quadrispinosus*, Thoms. O. E. ix. 868, ♂ ♀.

Head black and somewhat strongly punctate, with dark pubescence; frons coriaceous; clypeus and epistoma prominent, the former discreted and distinctly impressed transversely before its truncately rounded apex; of ♂ with mouth, except apices of mandibles, clypeus, epistoma and facial orbits, white; of ♀ with palpi and labrum stramineous. Antennae black: of ♂ setaceous, with apices acute and scape white beneath; of ♀ filiform, with the apices obtuse and four or five central joints white. Thorax entirely black, with dark pubescence; mesonotum somewhat strongly and confluent punctate; metathorax irregularly rugose, with two pairs of apophyses, of which the upper is the stouter and more acute; costae indistinct, areola strongly transverse; petiolar area evenly rugose, broadly discreted and basally very wide; spiracles circular. Scutellum black and evenly punctate. Abdomen ovate, glabrous and strongly nitidulous: of ♀ as broad as, of ♂ a little narrower than, the thorax; red, with segments four to seven, sometimes apex of the third and base of the first, black; anus white-marked; petiole broad, post-petiole bicarinate, not very strongly aciculate, apically explanate and laterally margined throughout; second segment of ♂ basally aciculate between the small and oblique thyridii; terebra not longer than the basal segment, with the spicula red and linear,

and the valvulae apically obtuse. Legs clear red ; coxae and trochanters, hind tarsi and apices of their tibiae and of their femora suddenly, deep black ; ♂ with the anterior coxae and trochanters more or less white. Wings normal, hardly clouded ; tegulae apically red, radix white. Length, 6-8 mm.

The quadrituberculate metathorax, strongly striate and carinate post-petiole and ♂ pale face will at once distinguish this species, whose ♂ has the second segment sometimes basally or entirely in the centre strigose and the third segment very rarely punctulate.

This is by no means an uncommon species in Britain. Stephens says, "This beautiful insect occurs in plenty in the vicinity of London, in June ; it is also found in the New Forest, in Salop, Scotland, etc." Bridgman found it at Brundall, near Norwich, in October ; and it is recorded from Essex. Beaumont took the male at Kilmore, in Ireland, in August ; Marshall at Cornworthy, in Devon ; Chitty at Sunbury, in Middlesex, in the middle of June ; and Piffard has given me both sexes from Felden, in Herts. I have taken the male upon the flower-tables of *Angelica sylvestris*, at Claydon bridge, in Suffolk, at the beginning of September, and the female in Tuddenham Fen, in late August. The latter, however, is more usually found during hibernation, in tufts of grass on the borders of woods, and has occurred to me in such situations in the Bentley Woods, in December, in a ribbon grass (? *Alopecurus pratensis*) and at Brede, in Sussex, in the usual tuft grass (*Aira caespitosa*). It has only once been bred : from *Eristalis* sp., by Marshall (cf. Ent. Ann. 1874, p. 124) ; its habits are probably similar to the very closely allied *R. nigrita*, Grav.

5. *nigrita*, Grav.

Phygadeuon nigrita, Gr. I. E. ii. 641 ; Tasch. Zeits. Ges. Nat. 1865, p. 23, excl. ♂. *Acanthocryptus nigrita*, Thoms. O. E. ix. 869, ♂ ♀.

♀. Head immaculate, rugosely and deeply punctate, with dark pubescence ; frons canaliculate between the large and glabrous scrobes ; epistoma and the discreted clypeus convex ; palpi ferrugineous. Antennae filiform, sub-incrassate, centrally white-banded and apically obtuse, with the third joint often basally red. Thorax entirely black, with dark pubescence ; mesonotum evenly and very strongly punctate ; metathorax sub-rugulose, with complete areae, strong obtuse apophyses and circular spiracles ; areola transverse, hexagonal and apically truncate ; petiolar area evenly rugulose and distinctly discreted. Scutellum black, deplanate, and strongly punctate. Abdomen ovate, shining and as broad as the thorax ; black, with the apical margins of the fifth to seventh segments obsoletely white ; post-petiole broad, sub-quadrata and a little narrowed basally, strongly and regularly aciculate throughout ; second segment strongly aciculate between the large and transverse thyridii, apically (like the remainder of the abdomen) glabrous and nitidulous ; terebra as long as the basal segment, lanceolate and red, with the valvulae infusate and apically acuminate. Legs black, with the tibiae, anterior tarsi and apices of the front femora, ferrugineous. Wings clouded ; radix white, tegulae piceous ; stigma and nervures black ; nervellus opposite and intercepted two-thirds below the centre. Length, $7\frac{1}{2}$ -8 mm.

♂. Head not narrowed behind the eyes, strongly and evenly punctate; black, with the face and clypeus entirely stramineous, more finely punctate and less shining, the latter truncately rounded and very narrowly infusate along its apex; labrum and base of the mandibles also pale; frons distinctly canaliculate between the large and glabrous scrobes. Antennae shorter than the body, centrally dilated and apically attenuate; black, with the scape entirely stramineous beneath, and the annellus rufescent throughout. Thorax stout, convex and entirely black with dark pubescence; mesonotum evenly and very strongly punctate; metathorax subrugulose with complete areae, strong obtuse apophyses and circular spiracles; areola transverse, hexagonal and apically truncate; petiolar area evenly rugulose and distinctly discreted. Scutellum black, strongly punctate and slightly less deplanate than in the ♀. Abdomen ovate, shining and somewhat small; black, with the apical margins of the sixth and seventh segments white; post-petiole broad, sub-quadrate and a little narrowed basally, strongly and regularly aciculate, with carinae between the spiracles; second segment and remainder of abdomen exactly as in ♀. Legs as in ♀, with the anterior trochanters white, their tibiae fulvous and the front femora only externally at the base black. Wings exactly as in the ♀, with the tegulae white and their centre red. Length, 6 mm.

Taschenberg says that the original ♂ agrees better with *Phygadeuon afflictor* than with the present ♀; in fact, I am inclined to think Thomson has adopted this suggestion—though no direct indication is given of it in Opusc. Ent.—since the latter's ♂ of the present species has the face, trochanters and anterior tibiae white, and the basal segment in both sexes is said to be strongly striate. He so meagrely describes it, however, that I have here given a full account of what is indubitably the true male.

This distinct species is said to be found in northern and central Europe, in the autumn. The only British record I have seen is Bridgman's, from Earlam and Eaton, near Norwich, in September; Miss Chawner has given me the female from the New Forest, and there is a male, probably from Shere, in Surrey, in Dr. Capron's collection. Laboulbène has recorded this species as parasitic upon the dipterous *Eristalis florens*; and I received two females from Wainwright, in November, 1905, which were "bred from pupae which Dr. Sharp doubtless correctly regarded as the Syrphid, *Myiatropa florea*. The pupae were found in very rotten wood, living amongst and buried in what was little better than mud; so that the problem of when and how the parent ichneumons succeeded in laying their eggs in them would be an interesting one to solve. Found in the New Forest, 1905." The two puparia from which they had emerged were also sent, proving them to be solitary parasites, which gnaw a somewhat irregular hole at or a little before the capital extremity of their hosts' pupae and constructing no cocoon of their own. Unfortunately no males were bred along with these females.

OBISIPHAGA, n. n.

Head stout, strongly rounded behind the eyes; vertex convex and narrow, ocelli not approximating orbits; face prominent. Antennae stout, shorter than body, with the basal joints a little incrassate apically.

Thorax normal, with scutellum convex and fully developed ; mesonotum deeply sulcate longitudinally throughout ; notauli distinct and lateral ; metathorax completely areated, with costulae strong ; areola hexagonal and sub-transverse, petiolar area broadly discreted, with apophyses stout though obtuse. Abdomen sub-ovate, glabrous and very strongly nitidulous ; basal segment dull, evenly explanate throughout, bicarinate and strongly aciculate, somewhat broad basally and laterally margined apically, its spiracles central and not prominent ; terebra stout and as long as the abdomen. Tarsi slender. Wings extending to apex of post-petiole, radial cell short and broad, areolet wanting.

Closely allied to *Catalytus* in the length and structure of the wings, and to *Aptesis*, in the stout antennae, but differing materially from both in the strongly and completely areated thorax, glabrous abdomen, mesonotal sulcus and the elongate terebra, which last two distinctions will instantly distinguish it from all other Ichneumonidae.

1. stenoptera, Marsh.

Aptesis stenoptera, Marsh. E.M.M. v. (1868), p. 156, ♀. *Hemiteles stenopterus*, Thoms. O. E. x. 985 ; Schm. Term. Füz. 1897, p. 510, ♀.

Head broader than thorax, finely punctulate, sub-coriaceous, black. Antennae infusate, with the scape and base of the first flagellar joint, which is slightly longer than the second, testaceous. Thorax finely punctulate and sub-coriaceous, black ; areae nitidulous. Abdomen basally black ; apex of first segment, whole of second and often base of the third testaceous ; remainder indeterminately piceous ; spicula red, valvulae infusate. Legs testaceous, with the apical tarsal joint dark. Wings narrow and not explanate beyond the centre, somewhat infumate ; stigma and radix dull piceous ; areolet irregular, transverse and outwardly wanting, often containing a white spot. Length, $2\frac{3}{4}$ mm.

Marshall says this species is very like *Microcryptus brachypterus*, but with no flagellar band, black basal segment, longer terebra, and the wings and thorax differ.

He first took it at Milford Haven, in 1867 and 1868 ; and Botusfleming, in Cornwall (in Brit. Mus.) ; subsequently Bloomfield recorded it (E.M.M. xvii. p. 258) from a sand-pit, in Guestling Wood, near Hastings, in September ; and Bignell thrice took it in Devon, in the middle of September, at Slade, Bickleigh and Exeter. Thomson has found it in Sweden. Towards the end of June, 1903, Waterston sent me a female from Edinburgh, together with the host's cocoon from which it had just emerged, remarking : " It is parasitic not on an insect but on an Arachnid, viz., the commonest of our British false-scorpions, *Obisium muscorum*, Leach. The ♀ of this species constructs a well-woven cocoon and there brings forth and hatches her eggs, which remain for a month or more attached to the genital pore. As a rule, *Obisium* is quite a formidable creature with its strong falces, but during reproduction, and especially in the last phase, it becomes inactive. It is at such a time, I suspect, that this ichneumon makes its attack. I had noticed chitinous fragments in the cocoon, but never saw the pest

till it emerged the other day." This is, I believe, the first instance of Ichneumonidae preying upon the Chernetidea.¹

[Since the above was written I have received from Mr. Robert Godfrey, of Edinburgh, both sexes of this species. In these cases both sexes are macropterous and have the mesonotal sulcus represented by two small central additional notauli; the ♀ differs in no way from the brachypterous form excepting in its narrower and entirely glabrous basal segment. The ♂ has the basal segment similarly sculptured, but with the spiracles slightly prominent; in other respects it differs from the ♀ only in having the flagellum exactly filiform and not apically obtuse.

The wings are somewhat narrow, resemble those of *Hemiteles* and extend to the apex of the abdomen; areolet exactly pentagonal, with the outer nervure entirely wanting; fenestra broadly discreted and larger above, extending nearly to the areolet; stigma luteous and narrow, emitting the short and curved radius from a little before its centre; basal nervure not strongly curved, lower basal entire and continuous; discoidal cell strongly acute apically and extending far beyond apex of areolet; nervellus slightly post-furcal and intercepted far below centre. Length, ♂ ♀ 2-2½ mm.

Mr. Godfrey tells me he took the pupae of these parasites on 15th September, 1905, from nests of *Obisium muscorum*, in Fifeshire. The ♀ emerged on February 19th following, and the ♂ on the 26th of the same month; both died the day after emergence. "The date of hatching," Mr. Godfrey writes, "corresponds with the normal period when the ♀ *Obisium* is laying her eggs. These she carries attached to her body during the whole series of embryonic changes, which take place before the young false-scorpions are able to begin life for themselves. It still puzzles me to know at what period exactly the ichneumon can get at the female, for while engaged in reproduction she has herself securely shut up within a little silk-lined clay nest. The parasite must either be rare or have great difficulty in finding a host, as, out of hundreds of nests of *Obisium* which I have examined, only three have been noticed to have parasites—taken as pupae, in April and September".]

CREMNODES, Förster.

Först. Wieg. Arch. 1850, p. 72.

Head entirely glabrous. Antennae very stout; basal flagellar joint much longer than the second. Thorax stout; metathorax oblique from the base, with a few distinct areae; areola obsolete, costulae strong and sharply defined. Scutellum distinct and discreted. Abdomen with the basal segment linear; the second basally very narrow and apically very broad; terebra only slightly exerted. Wings rudimentary, with obsolete neurulation.

The species of this curious genus differ so materially from any known *Hemiteles*, though most closely approaching the brachypterous form of

¹ Attention may be drawn in this connection to Entom. 1867, p. 312, where E. Newman tells us that *Proctotrypes calcar*, Hal. (Hym. Brit. i. 12, ♂ ♀)—named by F. Walker—has been bred from *Lithobius forficatus*. Twenty-eight larvae emerged from a single host.

H. subzonatus, that it is very incorrect, if only upon the evidence of their stout antennae, to add them to that already extensive genus as has been done by Thomson, copied by Schmiedeknecht.

Table of Species.

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| (2). 1. Metanotum very short ; post-petiole distinctly punctate | 1. ATRICAPILLUS, <i>Grav.</i> |
| (1). 2. Metanotum of usual length ; post-petiole obsoletely alutaceous..... | 2. PARADOXUS, <i>Bridg.</i> |

1. atricapillus, *Grav.*

Ichneumon atricapillus, Gr. Mon. Ped. 41. *Pezomachus atricapillus*, Gr. I. E. ii. 888. *Cremnoides atricapillus*, Först. Wieg. Arch. 1850, p. 72. *Hemiteles atricapillus*, Thoms. O. E. x. 996 ; Schm. Term. Füz. 1897, p. 556, ♀. *Cremnoides combustus*, Först. Wieg. Arch. 1850, p. 73, ♀.

A small flavidous species with smooth and shining thorax, and squamuliform, sub-rotund wings. Head black, with the mandibles and clypeus fulvous, palpi stramineous ; face rufescent, very feebly rugose and extremely finely punctate. Antennae with the six basal joints flavous and the remainder piceous ; first flagellar joint half as long again as the second, the fifth slightly longer than broad. Thorax flavous, glabrous and nitidulous, with metathoracic costae distinct. Scutellum flavous. Abdomen glabrous and nitidulous, hardly pubescent with the three basal segments flavous and the following sometimes darker ; terebra hardly a quarter the length of the basal segment, which is linear and finely and distinctly punctate, with or without prominent spiracles behind the centre ; second segment obsoletely alutaceous. Legs flavous and not very slender. Wings usually reaching base of mesothorax. Length, $1\frac{1}{2}$ -3 mm.

I fail to find any good specific character between the type form and *C. combustus* ; both occur with equal frequency with us, though the latter, whose wings are punctiform, has not hitherto been recorded from Britain.

Piffard has taken both forms at Felden, in Hertfordshire. I have swept the type in a damp meadow at Spring Vale, in the Isle of Wight, in the middle of August, and the form *combustus*, near Ipswich, in the middle of September ; and there is a long series in Capron's collection from Surrey. On the Continent it occurs in Sweden and Germany.

2. paradoxus, *Bridg.*

Apterophygas paradoxus Bridg. Trans. Ent. Soc. 1889, p. 417, ♀. *Hemiteles paradoxus*, Schm. Term. Füz. 1897, p. 555, ♀.

Head sub-cubical, smooth and broader than the thorax. Antennae sub-clavate, three-fourths the length of the body, and twenty-jointed ; basal flagellar joint twice longer than broad and one-fourth longer than the second, fifth quadrate. Thorax deplanate and a third longer than high ; mesonotum smooth, with notauli short ; metanotum as long as the petiolar area, with regular areae of which the areola is pentagonal and not longer than broad ; costulae entire, apophyses small and obtuse. Scutellum

smooth. Abdomen ovate, as broad as the head, with fine and diffuse lateral pubescence; basal segment narrow, curved and explanate throughout; the two basal segments alutaceous, rest smooth; the second as long as apically broad, basally contracted, with the sides straight; third quadrate and remainder transverse; terebra hardly exerted. Legs normal. Wings rudimentary, scarcely extending beyond base of scutellum.

Black; scape beneath, and basal flagellar joint apically, rufescent. Legs ferrugineous, with the hind coxae basally, and their femora centrally, piceous; posterior tarsi concolorous. Second and third segments castaneous, with the latter apically black. Length, 3 mm.

As was indicated by its author in his description, this species differs from the genus *Apterophygas* (Först. Verh. pr. Rheinl. 1868, p. 172) in having the second segment basally contracted and the first flagellar joint longer than the second; but from *Cremnodes* it diverges to almost an equal extent in the normal length of the metanotum; the sub-clavate antennae, however, appear to preclude its inclusion in *Thaumatotypus*, etc., in the *Hemitelini*, and the present genus (which certainly cannot long survive *Aptesis*, etc.) is a convenient resting-place for the present.

Rev. T. A. Marshall took a single example at Nunton, in Wilts. It has not been found elsewhere.

GLYPHICNEMIS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 181; *Stylacryptus*, Thoms. O. E. ix (1883), 869.

Head cubical; clypeus broad, discreted and apically rotundate; face short, black and roughly sculptured; genal costa continuous, mandibular teeth of variable length; eyes of ♀ pilose. Antennae stout and filiform, with the scape elongate, cylindrical and not apically excised; in ♀ usually basally red or centrally white-banded; of ♂ pilose, immaculate or dully rufescent basally. Metanotum strongly deplanate and discally deeply strigose-punctate; metanotal area entire and strong. Scutellum with its basal fovea centrally bisected. Abdomen with its petiole carinate; the ♀ with second almost longer than the third segment, and terebra only slightly longer than the first. Tibiae externally denticulate. Upper wings with the lower angle of the discoidal cell acute and its fenestra centrally corneous.

The salient feature of Förster's genus appears to be the distinct tibial spines, and these are present, at least upon the anterior tibiae, in all the species of Thomson's genus. I think, therefore, that, although the hind tibiae may not always be distinctly produced apically beyond the insertion of the tarsi, the earlier name of this genus should be retained in an expanded sense.

Table of Species.

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| (8). | 1. Mandibular teeth unequal; tibiae spinose, hind ones apically oblique (GNATHOCRYPTUS, Thoms.). | |
| (5). | 2. Frons deeply punctate; areola sub-transverse. | |
| (4). | 3. Frons confluent punctate; dentiparal area transcostate | 2. VAGABUNDA, Grav. |
| (3). | 4. Frons not confluent punctate; dentiparal area simple | 1. PROFLIGATOR, Fab. |

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| (2). | 5. | Frons finely punctate ; areola not broader than long. | |
| (7). | 6. | Costulae strong ; coxae not pale ; clypeus black | 3. SUFFOLCIENSIS, <i>Morl.</i> |
| (6). | 7. | Costulae obsolete ; coxae and clypeus pale | 4. CLYPEALIS, <i>Thoms.</i> |
| (1). | 8. | Mandibular teeth of equal length ; hind tibiae simple and not oblique (STYLOCRYPTUS, <i>Thoms.</i>). | |
| (10). | 9. | Tibiae externally white | 5. PARVIVENTRIS, <i>Grav.</i> |
| (9). | 10. | Tibiae not white-marked. | |
| (14). | 11. | Pilosity and metathoracic sculpture normal ; anus pale. | |
| (13). | 12. | Palpi of ♂ black ; four central flagellar joints of ♀ white | 6. BREVIS, <i>Grav.</i> |
| (12). | 13. | Palpi of ♂ and seven (or no) central flagellar joints white | 7. ERYTHROGASTRA, <i>Grav.</i> |
| (11). | 14. | Pilosity elongate ; metathorax rugose ; anus black | 8. SENILIS, <i>Gmel.</i> |

1. profligator, *Fab.*

Ichneumon profligator, *Fab.* S. E. 334. *Cryptus profligator*, *Fab.* *Piez.* 83 ; *Curt. Farm. Ins.* 44. *Phygadeuon profligator*, *Gr.* I. E. ii. 729, excll. varr. ; *Ste.* Ill. M. 303 ; *Tasch. Zeits. Ges. Nat.* 1865, p. 37 ♀. *Stylocryptus vagabundus*, *Thoms.* O. E. ix. 869, excl. ♀.

Head black, with long, sparse, grey hairs ; frons shining, strongly, evenly and not confluent punctate ; face and clypeus short, broad and rugulose, the latter discreted and distinctly margined in the centre before the truncate apex ; epistoma small and convex ; face of ♂ smoother with the clypeus apically emarginate and palpi piceous ; lower mandibular tooth half as long again as the upper ; palpi and centre of mandibles rufescent. Antennae rather longer than half the body, black ; of ♀ filiform and very slightly incrassate towards the obtuse apices, with the central five joints clear white and transversely impressed before their apices, and the basal flagellar joints at most dull ferrugineous at their apices ; of ♂ setaceous and entirely immaculate. Thorax black and pilose ; mesonotum shining and finely punctate, with the disc strongly deplanate, with very deep, longitudinally confluent punctures ; metanotum shining and obsoletely punctate with strong and complete areae ; areola distinctly transverse and twice broader than long, hexagonal and in ♀ basally rounded, its apical costa (and in ♂ the basal) quite straight ; dentiparal area not transcostate ; petiolar area glabrous, nitidulous and indistinctly discreted ; spiracles oval and somewhat large, apophyses obsolete. Scutellum black, sparsely punctate and shining with the basal fovea apically margined and centrally bisected by a transverse costa. Abdomen about as broad as the thorax, smooth and glabrous with white pilosity ; red, with the first segment except the post-petiole, and in ♂ disc of the seventh, black ; ♂ with extreme apices of the sixth and seventh glaucous ; petiole of ♂ parallel-sided, of ♀ explanate ; post-petiole dilated towards the apex, of ♀ smooth, of ♂ bicarinate and obsoletely punctate ; terebra as long as the basal segment, infusate, apically obtuse and setigerous ; valvulae of ♂ large, piceous and basally rufescent ; ventral plica in both sexes flavous. Legs stout, pilose, somewhat short ; black, with all the tibiae, front femora more

or less beneath, front tarsi and in ♀ the intermediate, red; ♀ coxae and trochanters piceous; posterior tibiae strongly spinose externally. Wings hyaline, sub-flavescens in ♀; radix fulvous and tegulae apically piceous; stigma of ♀ always testaceous, of ♂ piceous. Length, $6\frac{1}{2}$ – $8\frac{1}{2}$ mm.

Taschenberg was quite correct in describing this species as smaller than *P. vagabundus*, with the terebra longer; but I fail to understand what he intended to convey by the trisinate apex of the areola. It is very closely allied to the next species, but will easily be separated by the distinctions indicated under the latter.

Most of the records of this species have been attributed to the following. Curtis tells us it is a common parasite of *Depressaria daucella* (= *ner-vosella*); and Stephens that it used to be abundant about London in the summer, in Shropshire, etc. Johnson has recorded it from Armagh, in Ireland (Irish Naturalist, 1904, p. 256); and I have examined specimens from Tostock, in Suffolk (Tuck); St. Margaret's and Huntingfield, in Kent (Chitty); Far Forest, Bewdley (W. Ellis); Carlisle, in September (Tomlin); Plumstead (Beaumont); South Leverton, in Notts. (Thornley); Cheddar and Bristol (Charbonnier); Dover and Kingsdown (Sladen); Nairn, in Scotland; Kenmare, in Ireland; and Tarrington, in Hereford (Verbury); Kingscross, in Arran (Dalglish); Bonhill (Malloch); Guestling, in Sussex (Bloomfield); Felden, in Herts. (Piffard); Shere, in Surrey (Capron); Bury St. Edmunds (Tuck); and Greenings, in Surrey (W. Saunders). The male is first seen about the 12th June, flying among the herbage in woods, but as soon as the *Heracleum* is out both sexes often abound upon its tables, though they sometimes affect the flowers of *Chaerophyllum*; few males are seen in August, though the females are still common then upon the flowers of the *Angelica*, and remain abroad till the first few days of September. I have found the species in Suffolk, at Henstead, Southwold, Finborough, Bramford (21 ♂♂ and 2 ♀♀ on *Heracleum* at once), Ipswich, Stoke-by-Clare, Claydon, Tattingstone, Moulton, Aldeburgh, Burgh Castle, and Bentley. It has also occurred to me at Huntingfield, in Kent; commonly at Metton, in Norfolk, at the end of August; in the New Forest; Felden, in Herts., etc.; and I once took the male upon the flowers of *Alisma*, by the Gipping.

2. *vagabunda*, Grav.

Phygadeuon vagabundus, Grav. I. E. ii. 735; Ste. Ill. M. vii. 304; Holmgr. Sv. Ak. Handl. 1854, p. 56, ♀; Tasch. Zeits. Ges. Nat. 1865, p. 37, excl. ♂. *Stylocryptus vagabundus*, Thoms. O. E. ix. 869, excl. ♀. Var. *Phygadeuon profligator*, varr. 1 et 3, Gr. I. E. ii. 731, ♂. Var. *P. podagricus*, Gr. lib. cit. i. Suppl. 710; Ste. Ill. M. vii. 305, ♀.

A stout, black species with the legs broad and somewhat short, and the abdomen from the apex of the first segment, together with part of the legs, red; antennae of ♀ with no white band in the centre. Length, 7– $8\frac{1}{2}$ mm.

This species is so like the preceding that a detailed description would be but a vain repetition. Therefrom it is, however, abundantly distinct in a variety of minor, though perfectly constant, details. The ♀ is a stouter and more thick-set insect, but the ♂ needs close scrutiny for

discrimination. The most constant and reliable distinction is found in the frons, which in both sexes is dull, strongly and sub-rugosely and confluent punctate; the ♂ palpi are flavescent; the ♀ has the ten basal flagellar joints unicolorous red, with no vestige of a pale central band; the areola is sub-transverse and less than twice broader than long; and the dentiparal areae are more or less distinctly transcostate. The central carina of the scutellar fovea is usually less conspicuous; the apical segments of the ♂ are not glaucous-margined, and its valvulae with the apex and not the base broadly red; the terebra of the ♀ is rather shorter than the basal segment; the ♀ legs are very distinctly stouter, with their coxae usually black and the apical half of the posterior femora clear red; the ♂ has the intermediate tarsi paler and the hind tibiae apically infusate; the stigma in both sexes is always piceous and that of the ♀ never testaceous; and the size averages rather larger, but is increased by the stouter facies.

P. quadrispinus, var. 1, Grav., used to be considered the typical ♂ of this species, from which *P. profligator*, varr. 1 et 3, are said by Taschenberg to differ in having the whole of the hind and generally also of the anterior femora black; it is now, however, considered a good species, under the genus *Acanthocryptus*, and has not occurred in Britain. *P. podagricus* is a ♀ variety with the flagellar joints four to twenty red and the basal ones black above; it also has all the femora only basally, and the hind tarsi entirely, black.

It is quite impossible to arrive at a correct solution of the synonymy of this and the preceding species, which have been most hopelessly mingled since Gravenhorst first described *P. vagabundus* in 1829, and are now for the first time adequately distinguished. Even Thomson associated the sexes of both species; and Schmiedeknecht thought to solve the problem easily by synonymizing them in 1905; this, however, is obviously impossible though Bridg.-Fitch did much to add to the confusion in Britain by giving the ♀ of *P. vagabundus* both with and without white-banded flagellum.

Consequently we find a great mass of localities and details under the present species, the majority of which, doubtless, appertains to that last described, and the records must be regarded with due caution. Common in Norfolk; Laira, in Devon; Freshney Bogs, in Lincs.; South Leverton, in Notts.; Rye House and Norbury; Thorney, near Nottingham; Sutton, near Birmingham; Isle of Man; Shotover, Oxford and Tubney; Essex; St. Issey, in Cornwall; Dover; Hastings district; Mosely; Orton, near Carlisle; Kirknewton and Lauranston, near Edinburgh. Stephens says the typical form is not uncommon in the vicinity of London; and that the var. *podagricus*, which was originally found by Hope, at Netley, in Shropshire, occurs about London in June. My experience goes to show that this species is far rarer than the last-described; I have taken two females, both in August, at Felden, in Herts., on *Heracleum*, and in Finborough Park, in Suffolk, on *Angelica*. I took three others in 1894, about Ipswich, and Rev. E. N. Bloomfield has taken it at Guestling, near Hastings. The males are hardly commoner; I captured ten on *Heracleum* in the Bramford marshes, near Ipswich, in July, 1899; one or two in the same neighbourhood in 1894; Sladen has found it at Kingsdown, in Kent, in July; and Chitty at Oxted and Huntingfield, in June.

3. *Suffolciensis*, *sp. n.*

Head clothed with grey hairs, buccate and not narrowed behind the eyes; black, with apical half of the mandibles red and palpi piceous; frons shining, finely and somewhat sparsely punctate, obsolete centrally; face dull, strongly and confluent punctate, with the epistoma prominent; clypeus transversely rugose, narrow, deeply discreted, apically reflexed and simple; cheeks finely punctate and very short. Antennae black; of ♀ filiform, hardly longer than half the body, and sub-incrassate before the obtuse apices, with the ten basal joints red; of ♂ sub-setaceous, immaculate and two-thirds the length of the body. Thorax black and shining, with grey pubescence; mesonotum finely punctate, with the disc coarsely and longitudinally punctate, and notauli distinct, though short; metathorax with complete areae and small, though acute, apophyses; areola nearly circular, not broader than long, with the apical margin truncate; petiolar area flat, finely coriaceous, shining and not discreted; spiracles oval and not small. Scutellum black, glabrous, with a few scattered punctures; its basal fovea apically margined and centrally bisected. Abdomen glabrous and nitidulous, with grey pubescence; of ♀ ovate and clear red, its basal segment, except at apex, black, glabrous, sub-bicarinata to beyond its centre and margined throughout; of ♂ elongate, black with most though never whole of second and third segments red, fourth often discally red, sometimes only the incisures of the second and third segments red, its basal segment slender, elongate parallel-sided, aciculate between the somewhat prominent spiracles and apically glabrous; terebra shorter than the basal segment. Legs stout and black; all the tibiae except apices of hind ones in ♂, and tarsi except anterior in ♀, and anterior femora except at base, red; coxae and trochanters of ♀ more or less piceous; tibiae stout and externally spinulose. Wings a little clouded; tegulae and stigma piceous. Length, 4-6 mm.

The much smaller size, very finely punctate frons, sub-circular areola and infusate male abdomen will at once distinguish this species from the preceding; and from *G. clypealis* it may be known by the coloration of the clypeus, palpi, coxae, etc.

This species is so abundant, at all events in Suffolk, that I can only account for its having been hitherto overlooked by referring to the general muddle into which the group to which it belongs had fallen. Both sexes are taken freely in company, though never *in cop.*, upon the flowers of *Heracleum sphondylium*, *Chaerophyllum sylvestre* and *Spiraea ulmaria*, from the middle of June to that of July. I first met with it at Moulton, in Suffolk, on 17th June, 1899, where thirteen males and twenty-one females were captured upon the first-named plant; thence until 14th July both sexes occurred freely at Monks' Soham, Bramford, Wherstead, Henley, Marlesford, Farnham and Hinstead, in the same county, where the female outstays the male ten days. Elsewhere I have only received females from Golspie, in Scotland, in July, from Colonel Yerbury; Askern, in Yorks., from Mr. Roebuck; and from Dundonald, in July, from Mr. A. A. Dalglish.

4. *clypealis*, *Thoms.**Stylocryptus clypealis*, Thoms. O. E. ix. 870, ♂ ♀.

Black, abdomen and legs red ; clypeus, mouth and coxae testaceous ; tibiae spinose. Length, 4–6 mm.

So similar to *G. profligator* as to need no detailed description ; therefrom it differs in its much smaller size, with the base of the antennae, clypeus, mouth and coxae flavous ; and the ♂ tegulae, anterior coxae and trochanters, and palpi, white, with the legs, mandibles, centre of abdomen and base of antennae fulvous.

The frons is finely punctate, with no trace of a central furrow ; the areola sub-quadrate, not broader than long, with costulae obsolete and scape of ♀ clear fulvous.

I am enabled to bring this very distinct species forward as British on the strength of a single specimen in Dr. Capron's collection, probably from the vicinity of Shere, in Surrey. On the Continent, it is found in Germany and Sweden and was, consequently, very likely to occur with us.

5. *parviventris*, *Grav.*

Phygadeuon parviventris, Gr. I. E. ii. 746 ; Ste. Ill. M. vii. 305 ; Tasch. Zeits. Ges. Nat. 1865, p. 39, ♂ ♀. *Stylocryptus parviventris*, Thoms. O. E. ix. 870, ♂ ♀. Var. *Phygadeuon cnemargus*, Gr. I. E. ii. 734 ; Ste. Ill. M. vii. 303, ♂. Var. *P. varipes*. Gr. I. E. ii. 747, ♀ ; cf. Tasch. Zeits. Ges. Nat. 1865, p. 35.

Head black, with the mandibular teeth of equal length and peristomium not very broad ; clypeus discreted, of ♀ broadly rounded at the apex ; palpi white. Antennae of ♂ setaceous, dark ferrugineous and paler beneath, with the scape entirely black ; of ♀ filiform and slightly incrassate before the obtuse apices, with joints six to twelve white. Thorax immaculate ; metathorax strongly rugose, areola basally contracted and hexagonal though shorter in the ♂ ; petiolar area excavate, nearly vertical, transversely rugulose and not discreted ; apophyses distinct and obtuse, spiracles circular. Scutellum black. Abdomen shining and glabrous, narrower than the thorax, of ♂ oblong-oval, of ♀ sub-ovate ; entirely red or castaneous, petiole and anus of ♂ infuscate ; post-petiole transverse, gradually dilated apically, glabrous and bicarinate ; second segment of ♂ punctate ; terebra nearly half the length of the abdomen. Legs stout and black ; femora rufescent with their apices, except the front ones of the ♂, black ; anterior tibiae ferrugineous and externally white towards the base, hind ones black and externally white in the centre ; tarsi ferrugineous, with the hind ones infuscate ; tibiae not strongly spinose, hind ones simple. Wings hardly clouded ; tegulae black, radix piceous. Length, 7–8 mm.

The ♂ variety *cnemargus* has the radix stramineous, the hind femora and tibiae black, with the base of the latter ferrugineous, and the abdomen with the basal segment, except its apex, black, with the fifth to seventh laterally infuscate. The ♀ variety *varipes* has the metathoracic areation more distinct, the coloration lighter, the antennae tricoloured, and is rather smaller than the typical form ; it probably constitutes a distinct species.

The snow-white tibiae and large size will at once distinguish this species from all the others of its genus.

This species occurs throughout northern and central Europe, "nicht häufig," and has been bred in Prussia from both *Lophyrus pini* and *L. similis* by Brischke. In Britain, however, we have no records since the assertion by Stephens that the type form had been found, though apparently scarce, in June, near London; and that the var. *cnemargus* was not common near London in the same month. It certainly requires confirmation as a British insect; although a single example from Stephens' collection, which I have examined, still exists in the British Museum.

6. *brevis*, Grav.

Phygadeuon brevis, Gr. I. E. ii. 743; Ratz. Ichn. d. Forst. i. 145; Tasch. Zeits. Ges. Nat. 1865, p. 35, ♀. *Syllocryptus brevis*, Thoms. O. E. ix. 870, ♂ ♀.

♀. Head incrassate and black, with the clypeus discreted and broadly rounded at the apex; palpi pale and mandibles centrally red. Antennae filiform, rather less than half the length of the body, with the flagellar joints sub-moniliform; the four central joints dull white above and the basal ones ferrugineous beneath. Thorax immaculate; metathorax nitidulous and finely sculptured, with sharply defined areae; areola hexagonal, spiracles circular, apophyses distinct. Scutellum black. Abdomen shining, ovate, deplanate and not broader than the thorax; red, with the laterally curved petiole alone black; post-petiole nearly parallel-sided, sub-quadrate and twice broader than the petiole, bicarinate and centrally impressed; terebra half the length of the abdomen. Legs normal, red; coxae and trochanters black; femora rarely entirely red, the anterior above, and the hind ones almost or entirely, infusate; hind tarsi and apices of their tibiae nigrescent. Wings sub-hyaline, with the radix stramineous and the tegulae black.

♂. Palpi black; antennae short, the flagellar joints individually distinct, with the first hardly longer than broad; the abdomen smooth, the post-petiole not transverse and a little dilated apically; the red femora and tibiae with the latter and sometimes the former apically black.

Both sexes are said to be black with the abdomen, except its base, and the black-marked legs, red; the mandibular teeth of equal length; the peristomium not very broad; and the tibiae not strongly spinose, with the hind ones simple. Length, 4-7 mm.

The ♀ is similar in size to *G. parviventris*, but the tibiae are not white, the flagellar band is narrower, the metathorax is more nitidulous and less rugose.

This species is doubtless common with us, as it extends throughout the northern half of Europe; Ratzeburg records its parasitism upon *Carpocapsa pomonana*, which is also referred to by Miss Ormerod (cf. "Report of Injurious Insects," 1896, p. 9). Bridgman took it at Earlharn, near Norwich, in August; Marshall, in Yorkshire and St. Albans; Chitty, in South Wales, in September; and I possess examples from Shere, in Surrey (ex coll. Capron); Felden, in Herts. (ex coll. Piffard); Pitlochry, in Perthshire, early in September (ex coll. Beaumont); and have taken it myself, about the same date, upon fennel flowers, at Alderton, on the Suffolk coast. Ratzeburg's specimens emerged in May or June.

7. *erythrogastra*, Grav.

Phygadeuon erythrogaster, Gr. I. E. ii. 741, cf. i. Suppl. 711; Ste. Ill. M. vii. 305; Tasch. Zeits. Ges. Nat. 1865, p. 34, ♀. (?) *Stylocryptus erythrogaster*, Thoms. O. E. ix. 872, ♂ ♀.

Head black, with the clypeus discreted and broadly rounded at the apex; mandibular teeth of equal length; peristomium not very broad. Antennae filiform, slightly incrassate towards their apices; the two basal joints black and the following eight dark red. Thorax immaculate; metathorax hardly rugulose with the areola entire; petiolar area coarsely rugose and not discreted, spiracles circular. Scutellum black. Abdomen glabrous and red, with the petiole alone, or the basal segment except its apex, black; post-petiole glabrous and nearly parallel-sided with no carinae; terebra nearly half the length of the abdomen. Legs black or badious; the anterior tarsi and apices of their femora, the anterior and usually base of the hind tibiae, red; tibiae not strongly spinose, the hind ones simple. Wings slightly clouded, with the radix stramineous and tegulae black. Length, 6 mm.

The male is said to differ only in its white palpi and sub-rugose second segment; its abdomen is oval.

This species is very like the last-described, of which Taschenberg thought the ♀ no more than a variety, differing mainly in its flagellum bearing no white band; Thomson, however, says that the fifth to eleventh antennal joints of the ♀ are white, but it appears very doubtful to me whether he described the true Gravenhorstian species. He adds that it may be known by the immaculate anus in both sexes and the sub-rugosely punctate second ♂ segment.

With this species Schmiedeknecht synonymizes both sexes of *Phygadeuon obscuripes*, Tasch. (cf. ante p. 36, footnote).

This species occurs on umbelliferous flowers throughout north and central Europe, but has been seldom recognized in Britain. Gravenhorst tells us that Hope took it at Netley, in Shropshire; Stephens found it near London, in June; and it is recorded, upon the authority of Fitch, from Maldon, in Essex. I have seen no male of this insect, but the females (with no white flagellar band) have occurred to me on *Umbelliferae*, at Felixstowe, towards the end of June, and at Huntingfield, in Kent, at the beginning of August; Chitty has captured it at Forres, in September, and Marshall at Rannoch, Bishopsteignton in Devon, and Nunton in Wiltshire.

8. *senilis*, Gmel.

Ichneumon senilis, Gmel. S. N. i. 2704. *Phygadeuon senilis*, Gr. I. E. ii. 718; Ste. Ill. M. vii. 302; Tasch. Zeits. Ges. Nat. 1865, p. 40, ♂. *Stylocryptus senilis*, Thoms. O. E. ix. 871, ♂. (?) *Phygadeuon plagiator*, Gr. I. E. ii. 739; Tasch. Zeits. Ges. Nat. 1865, p. 34, ♀; cf. Thoms. O. E. ix. 871.

♂. Head black, with the palpi elongate and white; the face and cheeks with long and dense grey pubescence; clypeus sometimes white. Antennae elongate, with the flagellar joints not very distinct, the six basal more or less rufescent beneath. Thorax immaculate, with long and dense grey pubescence; metathorax strongly rugose, with the anterior areae

alone distinct; areola not transverse, apically contracted and emitting the costulae from before its centre; petiolar area basally entire and transversely coriaceous; spiracles circular, apophyses stout and acute. Scutellum black. Abdomen elongate, linear and narrower than the thorax; black, with segments two to five testaceous or dull red; the second and third longer than broad and smooth; petiole elongate and sub-linear; post-petiole nearly twice longer than apically broad, sub-glabrous, bicarinate and centrally pale red. Legs black; the anterior with trochanters apically and tibiae internally testaceous, their femora sometimes infuscate above; apices of the hind trochanters, and bases of their tibiae obscurely, ferrugineous. Wings hardly clouded; radix pale stramineous and tegulae sub-testaceous. Length, 7 mm.

♀. Head black, with long whitish pubescence; clypeus not distinctly discreted, apically broadly rounded. Antennae stout, half the length of the body; scape red and sometimes infuscate above; the basal seven or eight flagellar joints pale red and the remainder infuscate. Thorax immaculate, with long whitish pubescence; metathorax coarsely rugose, with the areola nearly semicircular and longitudinally rugose; petiolar area discreted, spiracles circular, apophyses distinct and somewhat stout. Scutellum black. Abdomen red, with the petiole alone black; post-petiole glabrous, laterally curved, with weak carinae and an apically deep central impression; terebra half or one-third the length of the abdomen. Legs red; the base and sometimes the apex of the hind femora, and the apex of their tibiae, nigrescent. Wings somewhat narrow, infumate; radix stramineous and tegulae ferrugineous. Length, 5-7 mm.

Phygadeuon senilis and *P. plagiator* are treated as good species in Marshall's Catalogue, and I here tentatively associate them as sexes of the same on account of the similarity of the descriptions, and also because Thomson says, under the former, "*Kanske Phygadeuon plagiator är honan till denna art.*"

The coarsely sculptured metathorax is very different from that of *G. brevis* and *erythrogastra*, and the long pilosity of the head and thorax appears unlike any other species of the genus which we possess.

The male is common on the Continent in May and June, and Stephens took it near London during the latter month. I took it near Ipswich in 1894, and again at Dunwich, in Suffolk, early in July, 1900; but the only females I have seen or heard of were captured by the late Mr. Alfred Beaumont at Clandon, late in June, 1897, and by Mr. A. J. Chitty at Huntingfield, in Kent, in August, 1903.

PHYGADEUON, *Gravenhorst.*

Gr. I. E. ii. (1829), 635; Thoms. O. E. x. (1884), 939.

Body very often coarsely punctate, more especially as regards the frons and mesonotum. Cheeks generally short; clypeus usually bidentate at its apex; face hardly ever white-marked; eyes of ♀ sometimes pubescent. Antennae not slender, of ♀ (with one exception) not white-banded. Metathoracic areae nearly always complete and strong, the basal laterally convergent, with the costulae very distinct; spiracles small and circular, apophyses rarely stout. Scutellum always black or castaneous. Abdomen

nearly always broadly red centrally ; terebra generally only shortly exerted. Legs not slender. Anterior wings ample, rarely abbreviated ; areolet usually externally entire ; radial nervure emitted from before the centre of the stigma, its apical always longer than its basal abscissa ; discoidal cell with the lower external angle more or less distinctly acute ; the fenestrae rarely confluent, generally divided by a corneous dot.

The group of species now comprised under this name constitutes but a small part of those enumerated in British catalogues, and is much more homogeneous in character, though it is still very difficult to separate them with any degree of accuracy from the larger and more stoutly built of the *Hemiteles*. The differentiation by means of the complete areolet has lately given place to—or rather been supplemented by—that of the incrassate antennae, and *H. crassicornis* (*subzonatus*) has even been here placed, although its size is small and areolet externally obsolete. In like manner many of the still-included *Phygadeuones*—*nanus*, *variabilis*, etc.—which often have that cell incomplete, and such *Hemiteles* as *ridibundus* and *aestivalis* that have the antennae and facies sufficiently stout for inclusion herein, though the areolet be incomplete, might with equal propriety be placed in either genus.

Kriechbaumer has yet further sub-divided the present genus by placing the Hercynicus-group of species into a new one (*Ischnocryptus*, Ent. Nachr. 1892, p. 351), but the various kinds differ so widely *inter se* that it appears invidious to adopt this genus, as has already been done by Schm., without also splitting up several other sections into distinct genera. I am not of Marshall's opinion that affinity is evidenced by parasites in the election of allied hosts, unless specialized characters be also shown ; if indeed this were the case, the present genus would be in need of wide sub-division, for we have records of its species' parasitism upon *Coleoptera*, *Diptera*, *Hymenoptera* and *Lepidoptera*.

The difficulty of identification has caused a comparative dearth of British records in this section, and I have had to draw somewhat largely from the specimens in my own collection in order to present some idea of their wide distribution in our Islands—records which extend to the four kingdoms, as well as to the Isles of Wight, Man and the Hebrides. It is undoubted that many British species are not yet included in the following account, and care must, therefore, be exercised in order that unrecorded kinds be not “forced” into the present-known descriptions.

Table of Species.

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| (16). | 1. Apex of clypeus smooth and not bidentate. | |
| (5). | 2. Apophyses stout and acute ; abdomen mainly red. | |
| (4). | 3. Petiolar area elongate and oblique ; hind femora red..... | 1. BITINCTUS, <i>Gmel.</i> |
| (3). | 4. Petiolar area short and vertical ; hind femora apically black | 2. RUFULUS, <i>Gmel.</i> |
| (2). | 5. Apophyses weak or wanting ; abdomen at most centrally red. | |
| (13). | 6. Nervellus antefurcal ; ♀ macropterous. | |
| (8). | 7. Areola transverse ; vertex not emarginate ; face white..... | 3. NYCTHEMERUS, <i>Grav.</i> |
| (7). | 8. Areola not transverse ; vertex emarginate ; face immaculate. | |

- (12). 9. Abdomen normal ; apophyses distinct, though small ; femora entirely red.
- (11). 10. Mesonotum shining, sparsely punctate ; terebra elongate..... 4. *SPECULATOR*, Grav.
- (10). 11. Mesonotum dull, closely punctate ; terebra short 5. *SODALIS*, Tasch.
- (9). 12. Abdomen linear ; apophyses wanting ; hind femora partly black 6. *PROCERUS*, Grav.
- (6). 13. Nervellus opposite ; ♀ brachypterous.
- (15). 14. Head not posteriorly narrowed and ♀ thorax black 7. *HEINEMANNI*, Först.
- (14). 15. Head posteriorly narrowed and ♀ thorax red 8. *GRAVENHORSTI*, Först.
- (1). 16. Apex of clypeus with two central teeth, distinct in ♂, in ♀ often granuliform.
- (20). 17. Flagellum slender and filiform in both sexes ; frons very closely punctate.
- (19). 18. Frons distinctly punctate ; coxae black 9. *VAGANS*, Grav.
- (18). 19. Frons obsoletely punctate ; coxae red 10. *RUSTICELLAE*, Bridg.
- (17). 20. Flagellum stout, of ♂ setaceous ; frons not or sparsely punctate.
- (24). 21. Second segment aciculate throughout ; basal flagellar joint shorter than the third.
- (23). 22. Apical segments glabrous and nitidulous ; areola entire 11. *RUGULOSUS*, Grav.
- (22). 23. Abdomen aciculate throughout ; areola obsolete 12. *SCOTICUS*, Marsh.
- (21). 24. Second segment not aciculate ; first flagellar joint longer than third.
- (30). 25. Clypeal teeth granuliform ; cheeks longer than mandibles ; vertex narrow.
- (27). 26. Stigma broadly white basally ; ♀ antennae tricoloured ; ♂ scape red ... 13. *LEUCOSTIGMUS*, Grav.
- (26). 27. Stigma not basally white, nor ♀ antennae tricoloured ; ♂ scape partly black.
- (29). 28. Apophyses acute ; petiolar area not discreted 14. *NANUS*, Grav.
- (28). 29. Apophyses wanting ; petiolar area discreted 15. *BRACHYURUS*, Thoms.
- (25). 30. Clypeal teeth large ; cheeks not longer than mandibles ; vertex broad.
- (34). 31. Frons strongly punctate ; abdomen deplanate.
- (33). 32. Post-petiole sub-rugose ; areola not entire 16. *CEPHALOTES*, Grav.
- (32). 33. Post-petiole not rugose ; areola entire 17. *FLAVIMANUS*, Grav.
- (31). 34. Frons not or finely punctate ; abdomen convex.
- (40). 35. Petiolar area not discreted ; wings clouded beneath stigma.
- (39). 36. Head and thorax not coarsely punctate ; petiolar area entire.

- (38). 37. Areola not quadrate ; petiolar area nitidulous..... 18. *VARIABILIS*, Grav.
- (37). 38. Areola quadrate ; petiolar area centrally rugose 19. *ASSIMILIS*, Grav.
- (36). 39. Head and thorax coarsely punctate ; petiolar area laterally weak 20. *DUMETORUM*, Grav.
- (35). 40. Petiolar area discreted ; wings not or uniformly clouded.
- (44). 41. Petiole long and slender ; apical abscissa of radius thrice longer than basal.
- (43). 42. Hind tibiae apically black ; abdomen centrally flavidous 21. *EXIGUUS*, Grav.
- (42). 43. Hind tibiae not apically black ; abdomen centrally red 22. *MIXTUS*, Bridg.
- (41). 44. Petiole normal ; apical abscissa less than thrice longer than basal.
- (54). 45. Notauli short, very distinct ; flagellum basally rufescent.
- (47). 46. Head cubical ; metathoracic areae complete 23. *AMBIGUUS*, Grav.
- (46). 47. Head posteriorly contracted ; metathoracic areae incomplete..... 24. *MARSHALLI*, Bridg.
- (53). 48. Abdomen lanceolate ; of ♀ distinctly compressed apically.
- (52). 49. Post-petiole glabrous ; size smaller.
- (51). 50. Flagellum not pilose ; head cubical ; terebra longer than first segment 25. *HERCYNICUS*, Grav.
- (50). 51. Flagellum pilose ; head sub-cubical ; terebra shorter than first segment 26. *BREVIARSIS*, Thoms.
- (49). 52. Post-petiole dull and alutaceous ; size larger 27. *NITIDUS*, Grav.
- (48). 53. Abdomen ovate and strongly convex, not apically compressed 28. *OVATUS*, Grav.
- (45). 54. Notauli nearly punctiform ; flagellum often black.
- (60). 55. Post-petiole not rimose ; eyes of ♀ nude.
- (59). 56. Post-annellus longer than scape ; flagellum mainly black.
- (58). 57. Front tibiae not inflated ; head hardly cubical 29. *FUMATOR*, Grav.
- (57). 58. Front tibiae inflated ; head cubical... 30. *INFLATUS*, Thoms.
- (56). 59. Post-annellus not longer than scape ; flagellum basally red..... 31. *SCAPOSUS*, Thoms.
- (55). 60. Post-petiole rimose ; eyes of ♀ densely pubescent.
- (62). 61. Wings normal ; antennae red to their centre 32. *DIMIDIATUS*, Thoms.
- (61). 62. Wings abbreviated ; antennae only basally red 33. *ROTUNDIPENNIS*, Thoms.

1. *bitinctus*, Gmel.

Ichneumon bitinctus, Gmel. S. N. i. 2719. *Cryptus bitinctus*, Gr. I. E. ii. 576 ; Ste Ill. M. vii. 290, ♀. *Phygadeuon bitinctus*, Tasch. Zeits. Ges. Nat. 1865, p. 32, ♀ ; Thoms. O. E. x. 942, ♂ ♀.

Head black, with the palpi and mandibles sometimes pale ; clypeus discreted, apically mutic and sub-truncate ; epistoma prominent ; cheeks

not elongate, genal sulcus somewhat deeply impressed. Antennae of ♀ filiform, not very stout nor apically incrassate, half length of body; basally, or except apex, ferrugineous; always red, with the scape fulvous beneath. Thorax immaculate and sub-pubescent; notauli short but distinct; metathorax rugose, with complete areae; areola sub-hexagonal and broader apically; petiolar area reaching beyond the centre, somewhat concave, strongly nitidulous and imperfectly discreted; apophyses acutely dentate, spiracles very small and circular. Scutellum black. Abdomen glabrous and shining, elongate-fusiform, as broad as the thorax; red or castaneous, with only the first segment, and sometimes the ♂ anus, black; six and seventh usually flavous-margined; post-petiole deplanate and nitidulous, with no carinae, longer than broad, especially in the ♂, its spiracles prominent and sides straight, though slightly divergent; third segment hardly shorter than the second, epipleurae narrow and spiracles some distance from the margin; terebra infuscate and a little shorter than the abdomen. Legs normal, red; hind coxae, except usually their apices and the hind tarsi, nigrescent. Wings more or less clouded; radix stramineous, tegulae red or testaceous; areolet small; stigma broad, emitting the radial nervure from almost before its centre; nervellus antefurcal. Length, 5-8 mm.

The hind coxae are sometimes entirely red and the length of the terebra appears to be variable.

The broad stigma, small areolet, discreted clypeus, prominent epistoma and the conformation of the petiolar area, will distinguish this species from the whole of the remaining species of the genus.

Scarce. Taken in June, near London (Stephens); Acomb Wood, near York, in 1881 (Wilson, Yorks. Nat. Un. 1882, p. 104). It appears to be very rare in Britain; I only possess females found by Bignell, at Exeter, on 2nd October, 1885; it is, however, not uncommon on the Continent, where Gravenhorst took it in July, flying around plants infested with *Aphides* and their attendant *Syrphid* larvae. I am of opinion that it was on the strength of specimens of this species that Marshall erroneously introduced *Hemiteles pullator* into our fauna; there is a female, under the latter name, in his collection (in Brit. Mus.) from Leicester.

2. *rufulus*, Gmel.

Ichneumon rufulus, Gmel. S. N. i. 2717. *Cryptus rufulus*, Gr. I. E. ii. 622. *Phygadeuon rufulus*, Tasch. Zeits. Ges. Nat. 1865, p. 25, ♀. (?) *P. afflictor*, Gr. I. E. ii. 642; Tasch. Zeits. Ges. Nat. 1865, p. 38, ♀; Thoms. O. E. x. 942, ♂ ♀; *Medophron niger*, Brisch. Nat. Ges. Danz. 1882, p. 344, ♀.

Head black; face somewhat narrow, clypeus distinctly discreted. Antennae filiform, not very stout, with the third joint more than twice longer than broad; pale ferrugineous, with the scape black and the apical half of flagellum infuscate. Thorax immaculate and closely punctate throughout, dull with obsolete notauli; metathorax slightly rugose and shining, with the areae complete and the costae well-defined; areola hexagonal, sometimes a little longer than broad; petiolar area discreted and nearly vertical; apophyses stout and acute, spiracles circular. Scutellum black. Abdomen black, with the second and third segments, the apex of the first and more or less of the fourth, red; seventh, and sometimes also the sixth, with a

whitish membrane; post-petiole carinate and finely aciculate, slightly impressed centrally, with the sides straight; second segment nitidulous and shorter than the third; terebra half the length of the abdomen. Legs red; hind pair with tarsi, apices of femora and of tibiae, nigrescent. Wings clouded; stigma black, basally white; radix white, tegulae black; nervellus antefurcal. Length, 7 mm.

Thomson (O. E. 1241) says *P. rufulus* agrees with *P. afflictor* in every way, excepting that its abdomen is red-yellow; and I here treat the latter as a very distinct variety, having the metathorax more coarsely rugose, the areola nearly semicircular, and all the coxae and trochanters, together with the bases of the hind tibiae and, above all, the abdomen centrally, black.

P. afflictor closely resembles *Acanthocryptus nigrita* in size and conformation, but the terebra is as long as the depressed and elongate petiole, the post-petiole is bicarinate, the second ♀ segment is smooth and shorter than the third, the second ♂ segment is sub-scabrous and hardly longer than the third, the ♂ antennae are black, the petiolar area reaches beyond the centre of the metathorax, and its areola is transverse.

It were, perhaps, better placed in *Acanthocryptus*, but the flagellum is bicoloured, the apophyses smaller and body less nitidulous.

This species, which occurs not uncommonly on the Continent in June, has been bred by Kawall from *Hypera rumicis*; he observed a pair *in cop.* for fifteen seconds, on July 23rd (*cf.* Stett. Ent. Zeit. xix. p. 67), but did not describe the male. There appear to be no British records of this species, though it has long stood in our catalogues; I am able to confirm it as indigenous, however, on the strength of females, which I captured in the Ipswich district of Suffolk in 1894, in the marshes of Bungay Common, early in June, 1900; and two found by Tuck, in Finborough Park, in the same county, during the following August.

3. *nycthemerus*, Grav.

Phygadeuon nycthemerus, Gr. I. E. ii. 647; Tasch. Zeits. Ges. Nat. 1865, p. 49, ♂; Thom. O. E. x. 943, ♂ ♀.

Head sub-buccate, black; frons densely and finely punctulate; ♀ with the apex of the face, clypeus and cheeks flavous; ♂ with the whole mouth, face and cheeks white; clypeus distinctly discreted, broad and short. Antennae of ♂ setaceous, very much shorter than the body, with the scape white beneath. Thorax immaculate; mesonotum densely and finely punctate; metathorax very dull, with areola a little broader than long; petiolar area parallel-sided, discreted and transversely rugulose towards the base; apical margin of the sub-quadrate dentiparal areae callosely elevated, but apophyses wanting; spiracles small and circular. Scutellum black. Abdomen not broader than the thorax, fusiform, finely and closely punctate throughout; generally black, but sometimes with the three basal segments more or less castaneous; anus pure white; post-petiole carinate, sub-quadrate and hardly longer than broad, a little broader than the slender and elongate petiole; terebra as long as the basal segment. Legs somewhat slender, of ♀ red, of ♂ flavous, with the anterior stramineous and their coxae and trochanters white; hind coxae, tro-

chanters, tarsi and apices of tibiae, black. Wings slightly clouded; radix and tegulae of ♂ white; nervellus antefurcal. Length, 6–8 mm.

This species resembles *P. flavimanus*, but the capital markings, transverse areola, obsolete apophyses and the coloration of the legs will at once distinguish it. Brischke thought the ♂ synonymous with *Cubocephalus nigriventris*, Thoms., but he was certainly in error.

By no means common with us, though widely distributed in northern and central Europe. Bignell records it from Bickleigh, early in September; and three males are said to have been bred from the pupae of *Spilosoma fuliginosa* (cf. Proc. S. Lond. Ent. Soc. 1896, p. 82). I have only seen a couple of males, taken by Dr. Capron, probably in the vicinity of Shere, in Surrey.

4. *speculator*, Grav.

Phygadeuon speculator, Gr. I. E. ii. 704; Tasch. Zeits. Ges. Nat. 1865, p. 26, ♀; Thoms. O. E. x. 945, ♂ ♀.

Head black and sub-pilose, of ♀ not narrowed behind the eyes; frons shining, sparsely punctate and pilose; vertex angularly emarginate; clypeus discreted; genal sulcus fine, but deeply impressed, epistoma prominent. Antennae of ♀ exactly filiform, slightly longer than half the body, with the three basal flagellar joints ferrugineous beneath; scape of ♂ immaculate. Thorax black; mesonotum shining, sparsely punctate and pilose; metathorax rugose, with complete areae; areola sub-triangular, acuminate basally and, in ♂, emitting the costulae from far behind its centre; petiolar area discreted, with its central area broad; apophyses and spiracles small, the latter circular. Scutellum black. Abdomen of ♀ ovate, sub-deplanate, slightly broader than the thorax, extremely glabrous and nitidulous; black, of ♀ with second and third segments, excepting the sides and apex of the latter, red; basal segment very broad, post-petiole closely and regularly aciculate, of ♂ oblong-quadrate, of ♀ sub-transverse, deplanate and parallel-sided; spiracles of the second and third segments situated in the not acutely inflexed epipleurae; terebra nearly as long as the abdomen, with the valvulae black. Legs normal, of ♀ entirely red, of ♂ with the coxae black; tarsal claws small and not stout. Wings small, narrow and infusate; radix red, tegulae black or ferrugineous; radial nervure emitted from the centre of the rather broad stigma; nervellus antefurcal. Length, 5–6 mm.

The angularly emarginate vertex, position of the radial nervure and metathoracic costulae will distinguish this species from all its congeners, of which it may be known further from *P. sodalis* by the presence of the genal sulcus, its shining and sparsely punctate frons and mesonotum, the relative length of the terebra, and by its glabrous second abdominal segment.

This species has a wide Continental distribution, and has been found by Marshall, at St. Albans (in Brit. Mus.). I possess several females, taken by Stanley Kemp, in April, 1902, at Acton and Notting Hill; by Piffard, at Felden in Herts., in the same month; and by Charbonnier, at Redland, near Bristol, in May. I have rarely seen it, at Ipswich, in May, and took a single example on the window of Monks' Soham House, Suffolk, on 31st May, 1905. It has not yet been bred.

5. *sodalis*, *Tasch*.

Phygadeuon sodalis, *Tasch*. Zeits. Ges. Nat. 1865, p. 29, ♀; Thoms. O. E. x. 945, ♂ ♀.

Head black, palpi of ♀ red, mouth of ♂ white; vertex angularly emarginate; genal sulcus wanting; frons densely and very finely punctate and pubescent, somewhat dull; face of ♀ coarsely aciculate apically, of ♂ with white pilosity; clypeus not distinctly discreted. Antennae of ♀ slightly incrassate apically and red basally; of ♂ with the scape white beneath. Thorax immaculate; mesonotum densely and very finely punctate and pubescent, somewhat dull; metathorax coarsely rugose, with complete areae; areola shortly hexagonal, broader apically and emitting the costulae from behind its centre; petiolar area feebly discreted; apophyses weak, spiracles circular. Scutellum black. Abdomen black, with segments two to four entirely, and the apex of the first, red; anus white; basal segment rather broad, punctate and strongly bicarinate; second and the base of the third coarsely, deeply and confluent punctate; terebra slightly shorter than the first segment. Legs red, with the hind tarsi and apices of their tibiae black; ♂ with the anterior trochanters white; claws not stout. Wings with the radix white; radial nervure emitted from the centre of the rather broad stigma; nervellus antefurcal. Length, 4-6 mm.

The angular emarginate vertex of the head, together with the peculiar puncturation of the frons, mesonotum and second abdominal segment, will at once distinguish this species.

Bridgman added this species to the British list (*Trans. Ent. Soc.* 1886, p. 339) on the strength of a specimen received by him from Mr. J. E. Fletcher, and probably captured at Worcester. A second, from the London district, was exhibited at the S. Lond. Ent. Soc. in March, 1890; and I was so fortunate as to sweep a third from herbage, at Brandon, in Suffolk, on 4th June, 1903. On the Continent, where it is somewhat widely distributed, Brischke has bred it, from a species of *Syrphus*, in Prussia. Marshall has taken it at Cornworthy, in Devon.

6. *procerus*, *Grav*.

Phygadeuon procerus, *Gr.* I. E. ii. 722 (part), excl. var. 2; *Ste.* Ill. M. vii. 302 (part); *Tasch.* Zeits. Ges. Nat. 1865, p. 51, ♂. (?) *Ichneumon Esenbeckii*, *Gr.* Mon. Ped. 37. *Pezomachus Esenbeckii*, *Gr.* I. E. ii. 883. *Theroscopus Esenbeckii*, *Först.* *Wieg.* Arch. 1851, p. 99, ♀. *Hemiteles Esenbeckii*, *Thoms.* O. E. x. 993; *Schm.* Term. Füz. 1897, p. 559, ♂ ♀.

♂. Head black, with palpi pale; clypeus discreted, apically truncate, with the basal foveae distinct. Antennae setaceous, half as long again as the body. Thorax immaculate; metathorax elongate, closely and confluent punctate; areae complete and distinct; petiolar area oblique, discreted and transversely sub-rugose; apophyses wanting, spiracles very small and sub-circular. Scutellum black. Abdomen strongly elongate and linear, narrower than thorax; black, with segments two to four or five entirely, and the apex of the first, red; anus immaculate; basal segment closely and irregularly aciculate; post-petiole small, quadrate and parallel-sided with moderately prominent spiracles; second segment closely and

somewhat confluent punctate, intumescent at the spiracles ; third closely but not confluent punctate. Legs slender and red ; coxae and trochanters, hind tarsi, apices of their tibiae and of more or less of their femora, black. Wings somewhat clouded ; radix pale flavous, tegulae infusate or black. Length, 7 mm.

We have no clue to the correct position of this species, but that here assigned to it appears most natural, since Taschenberg tells us the clypeus is apically truncate, if, indeed, it belong to the present genus as now restricted at all. The distinctly punctate second and third segments certainly bear analogy with those of the last-described species. The synonymy of Gravenhorst's ♂ has become somewhat involved. Most features of the original description coincide with *Colpognathus celerator* (cf. Ich. Brit. i. 278), from which the present insect differs in its distinctly discreted petiolar area, etc., and the second variety is considered distinct, under the name *P. Marshalli*, Bridg. ; indeed there is some doubt if the original of Gravenhorst's description has not been entirely evolved.

Gravenhorst took this male on *Umbelliferae*, in July and August. Stephens records it from near London, in June, but all the specimens, so called by British entomologists, that I have been able to examine have certainly belonged to the *Phaeogenini*.

? ♀. Head black and very finely alutaceous, feebly and diffusely punctate and nitidulous ; clypeus entirely glabrous, epistoma prominent and dark red ; mandibles red, apically piceous ; palpi testaceous. Antennae basally red ; first flagellar joint not longer than second, nor fifth than broad. Thorax red, sternum often piceous ; metathorax broad and convex, petiolar area sub-vertical, its basal costa wanting, apophyses sub-acuminate. Abdomen very diffusely pubescent, red, with the apex of the third and the following, except the apical margins, black ; basal segment short, petiole slightly, post-petiole hardly, explanate ; two basal sharply aciculate, rest glabrous ; terebra as long as first segment, with dark valvulae. Legs red, hind femora and tibiae apically infusate. Wings squamuliform. Length, 5 mm.

This female is here placed for convenience ; it certainly belongs to *Phygadeuon* rather than *Hemiteles*, but its association is not yet demonstrated. Thomson's ♂ differed only in sexual characters. Bignell has taken this female at Whitsand Bay, early in May.

7. *Heinemanni*, Först.

Stibentes Heinemanni, Först. Wieg. Arch. 1850, p. 78 ; Capron. Entom. 1879, p. 15, ♀. *Phygadeuon Heinemanni*, Thoms. O. E. x. 948, ♀.

Head with the vertex not broad, cheeks short and the scrobes wanting ; epistoma dull and rugose ; clypeus arcuately discreted and laterally foveolate ; peristomium broad ; mandibles stout, elongate and mainly red ; palpi piceous ; frons smooth and shining, with deep scattered punctures ; ocelli approximate. Antennae fuscous, inserted far below the centre of the eyes ; bicoloured, basally fulvous, with the three basal flagellar joints gradually decreasing in length and the first shorter than the scape. Thorax smooth and shining, with the notauli sub-entire ; metathorax

short, with the petiolar area discreted. Scutellum black, smooth and shining. Abdomen black and centrally castaneous; the three basal segments strongly developed, with the remainder contracted and inconspicuous; basal segment slender, narrow and elongate, hardly explanate apically, smooth, with no tubercles; second segment broader and shorter than the third; terebra as long as the basal segment. Legs somewhat stout, testaceous; calcaria very short and curved. Wings hemipterous, reaching the apex of the post-petiole, apically rotundate; nervures incomplete, though the stigma sometimes present. Length, 3-4 mm.

Dr. Capron first found this little insect in Britain, and records it (*loc. cit.*) from Shere; there is a long series in his collection. It has subsequently been discovered by Bignell, at Bickleigh, early in August; by Piffard, at Felden in Herts.; and by Routledge, at Tarn Lodge, near Carlisle. I once took it at Hursthill, near Brockenhurst, on 3rd August. It is widely distributed in northern Europe.

8. *Gravenhorsti*, Först.

Stibeutes Gravenhorstii, Först. Wieg. Arch. 1850, p. 77, ♀. *Phygadeuon Gravenhorstii*, Thoms. O. E. x. 948, ♂ ♀. (?) *Ichneumon Bonellii*, Gr. Mon. Ped. 34; *Pezomachus Bonellii*, I. E. ii. 885; *Stibeutes Bonellii*, Först. Wieg. Arch. 1850, p. 78, ♀.

Head with the vertex not broad, cheeks short, scrobes wanting, clypeus arcuately discreted; peristomium broad, mandibles stout and elongate. Antennae basally fulvous; of ♀ inserted far below the centre of the eyes, and the three basal flagellar joints gradually decreasing in length, with the first shorter than the scape. Mesonotum rosy. Abdomen castaneous; basal segment slender and elongate, of ♂ linear and twice longer than the hind coxae, with the dentately prominent spiracles in its apical third; third segment of ♂ longer than second. Legs somewhat stout, calcaria very short and curved; fulvous, ♂ with the hind tarsi infusate at base and apex. Wings with the radial nervure emitted from the centre of the stigma; of ♀ squamiform; the nervellus of the ♂ opposite and hardly intercepted. Length, 3-4 mm.

Thomson shortly describes both sexes as above, and it may be well to add that the ♀ further has:—The face somewhat coarsely punctate; frons and vertex smooth, the former with scattered coarse punctures, and the palpi flavous. Antennae half length of the body, with the joints from the fifth transverse. Prothorax, mesonotum and scutellum red and glabrous, with the notauli wanting; meta- as long as the meso-thorax, with distinct costae and areola; petiolar area vertical and basally entire; apophyses distinct, though small. Abdomen with long and sparse pubescence; first segment with its basal half black; anus retracted; terebra hardly two-thirds the length of the basal segment, its spicula acuminate and valvulae pilose. Wings hardly reaching beyond the base of the metathorax.

The ♀ differs from that of *P. Heinemanni* in the posteriorly narrowed head, strongly convex abdomen, sparsely pilose mesonotum, and in having the spiracles of the second segment further from the lateral margin. Even though *P. Bonelli* should prove to be distinct—and very little appears to be known of this south European species—it was probably erroneously catalogued as British in 1870, and no records of it exist.

P. Gravenhorsti has not before been noticed in Britain, but Mr. E. A. Butler has kindly given me a female, which was bred by Tuck from a nest of *Bombus hortorum*, at Tostock, in Suffolk, in 1897; and I swept a specimen, in Tuddenham Fen, in Suffolk, at the end of August, 1902. Dr. Capron, also, found it at Shere, in Surrey. It has only been noticed in Sweden and Germany on the Continent.

9. *vagans*, Grav.

Phygadeuon vagans, Gr. I. E. ii. 738; Tasch. Zeits. Ges. Nat. 1865, p. 31; Thoms. O. E. x. 951, ♂ ♀. *P. fumator*, var. 7, Gr. I. E. ii. 694, excl. ♀.

Head black, with the palpi red and mandibles immaculate; frons finely and closely punctate; vertex broad, and not narrowed behind the eyes; cheeks broad with an impressed sulcus; clypeus apically acutely bidentate, obsoletely discreted with the basal foveae large. Antennae very slender, filiform and piceous. Thorax immaculate; metathorax of ♂ short, of ♀ coriaceous; areae entire; areola transverse, broader apically, emitting the costulae from behind its centre, of ♂ sub-reniform and centrally costate; petiolar area reaching beyond the centre, discreted, of ♂ transversely rugose with apophyses distinct, and very small, circular spiracles. Scutellum black. Abdomen nitidulous, black, with segments two to five red and the sixth and seventh apically white; basal segment not carinate, of ♀ gradually explanate, strongly nitidulous and obsoletely aciculate, of ♂ coarsely rugose with the post-petiole quadrate and parallel-sided; terebra slightly shorter than half the abdomen. Legs red; coxae excepting front ones of ♂ beneath, trochanters, hind tarsi, apices of their tibiae and also rarely of their femora, black. Wings somewhat clouded; radix stramineous, tegulae black; areolet small and the nervellus antefurcal. Length, 4-6 mm.

P. fumator, var. 7, appears to differ only in having the central segment black-marked.

This is a very distinct species in the vertical conformation, frontal and petiolar sculpture, slender antennae, immaculate tegulae and mandibles, small areolet and broad, sulcate cheeks.

It appears somewhat rarer with us than upon the Continent, where it is found in August. Maldon, in Essex (Fitch); Land's End (Marquand); Plym Bridge, early in May (Bignell). I have never found it before August, and the female not before the last days of September and early October, when it may sometimes be discovered at dusk, sitting on the stems of yarrow, on warm evenings. In the day-time both sexes frequent the flowers of *Daucus carota*, and the female, when alarmed, rarely attempts flight, but falling to the ground, endeavours to escape by running swiftly among grass stems. I have taken it at Westleton, Benacre Park, Wherstead and Bentley Woods, in Suffolk, and in the Blean Woods, in Kent; and received it from Abinger Hammer, Felden, Shere; Greenings, in Surrey; Scotton Common, near Gainsborough and Huntingfield, in Kent.

io. rusticellae, Bridg.

Phygadeuon rusticellae, Bridg. Trans. Ent. Soc. 1886, p. 101, ♂ ♀. (?) *P. subtilis*, Gr. I. E. ii. 701; Tasch. Zeits. Ges. Nat. 1865, p. 55, ♂; cf. Brisch. Schr. Nat. Ges. Danz. 1882, p. 342.

Head hardly narrowed behind the eyes; frons smooth and shining. Antennae distinctly slender, black; flagellar joints piceous; scape of ♂ flavous, of ♀ ferrugineous beneath. Thorax nitidulous; mesonotum finely punctate; metathoracic areae distinct, with the areola transverse. Scutellum black. Abdomen elongate-ovate, smooth and shining; of ♂ black, with segments two to four mainly red; of ♀ red, with the basal segment alone black, somewhat long and slender, with the post-petiole thrice broader than petiole and terebra quite half the length of the abdomen. Legs normal, red, with the anterior paler; hind tarsi, base and apex of their tibiae, and sometimes the base of their coxae, infusate. Wings with the stigma black. Length, 4-5 mm.

Bridgman says this species is closely allied to *P. vagans*, but differs from it in having the coxae red, sometimes the hind pair dark basally above or very rarely almost entirely dark, and in the coloration of the scape. He also indicates its relation with *P. austriacus*, Grav., and adds that the colour of the ♀ abdomen is occasionally black, with only the two basal segments apically red.

[I am quite unable to find sufficient grounds for supposing the present species to be distinct from Gravenhorst's little-known male, *P. subtilis*, since the coloration of the hind femora appears the only discrepancy:—

Head with palpi and centre of mandibles stramineous; clypeus discreted and centrally bidentate. Antennae filiform, rather longer than half the body, with scape flavous beneath. Thorax nitidulous; metathorax elongate, feebly rugose, sub-glabrous, with complete areae; areola sometimes confluent with the very short and vertical petiolar area; apophyses obsolete and spiracles circular. Scutellum black. Abdomen oblong, deplanate, shining; black, with segments three, four, and sometimes the second fulvidous, sides of the fourth infusate; basal segment very slightly explanate throughout, feebly carinate and canaliculate, with obsolete aciculation and tubercles, post-petiole nearly twice longer than broad; second segment nitidulous and extremely obsoletely punctulate. Legs red; anterior paler, with the base of the coxae black and apices of the trochanters flavidous; hind legs black, with apices of the trochanters and centre of tibiae flavidous. Wings not or hardly clouded; stigma nigrescent, radix and tegulae white. Length, 5 mm.]

This species, which has not yet been discovered on the Continent, was bred by Mr. W. H. B. Fletcher from old birds' nests at Bognor—perhaps from *Tinea rusticella*; I have seen nothing like it. *P. subtilis*, which was probably erroneously recorded from Britain by Marshall, in 1870, has been found only at Breslau, in July.

II. *rugulosus*, Grav.

Phygadeuon rugulosus, Gr. I. E. ii. 686; Tasch. Zeits. Ges. Nat. 1865, p. 22, ♂. *P. semipolitus*, Tasch. lib. cit., p. 28, ♀; Thoms. O. E. x. 951, ♂ ♀; cf. Bridg. Entom. 1882, p. 275 et 1880, p. 53.

♀. Head black, with the palpi red; clypeus indistinctly discreted; epistoma protuberant. Antennae brown, distinctly filiform though slightly incrassate towards the apices, basally rufescent; first joint shorter than the third. Thorax immaculate; metathorax coarsely rugose with complete areae; areola hexagonal, broader apically; petiolar area obsoletely discreted; apophyses small, spiracles circular. Scutellum black. Abdomen black, with segments two to four red, and the anus white; basal segment slender and elongate, longer than the terebra, with obsolete carinae; post-petiole and the second segment finely, densely and regularly aciculate, the remainder nitidulous. Legs red; coxae, trochanters, hind tarsi, apices of their tibiae and of their femora, black. Wings with the radix white, areolet small and the nervellus antefurcal. Length, 4-5 mm.

This species, Thomson says, resembles *P. vagans* in its wings, metathorax and clypeal conformation, but the antennae are stouter and brown, and the longitudinally strigose second segment is very distinctive; the metathorax of the former is coriaceous, and Taschenberg was probably in error in describing it as coarsely rugose, since examples in my collection have the metanotum finely wrinkled and the metapleurae somewhat rugulose.

♂. Head black, with the palpi stramineous; clypeus indistinctly discreted, basally bifoveate, apically obtusely bidentate. Antennae sub-filiform, a little longer than half the body, and basally ferrugineous beneath. Thorax immaculate; metathorax coriaceous, basally nearly smooth; areae complete, with the basal transverse costa straight and continuous; areola narrow, transverse, entire, apically straight and basally regularly curved; petiolar area oblique and obsoletely aciculate; apophyses normal and spiracles circular. Scutellum black. Abdomen narrower than the thorax; black, with segments three, four and apex or whole of the second, red; anus immaculate; basal segment elongate, very gradually explanate apically, and distinctly aciculate, with the spiracles more or less projecting upwards; second segment distinctly aciculate, remainder smooth and shining. Legs normal, red; coxae and trochanters black, latter red beneath; hind tarsi and tibiae infuscate. Wings not clouded; stigma black, radix and tegulae white. Length, 5 mm.

It will, I think, be seen from the above descriptions that no doubt can remain that Taschenberg's species must be associated with Gravenhorst's ♂.

Gravenhorst says this species, which is found throughout central and northern Europe, occurs in July; but all the British captures have been effected in May and early June. It appears to be confined to the west of England, where it is probably not uncommon, and I have never seen it in the eastern counties. Mr. Parfitt found it on the window of his house in Exeter; Barrett took it at Pembroke; Davies has sent me both sexes, associating with *Crabro Wesmæli*, from S. Issey, in Cornwall; and Charbonnier finds it freely at Redland, near Bristol, in May. In Marshall's collection are specimens from Lasingham, in Yorks.

12. *Scoticus*, *Marsh.**Phygadeuon scoticus*, Marsh. E.M.M. v. 154, ♀.

♀. Black, somewhat deplanate, with fulvous pilosity. Head coriaceous, remotely punctulate; vertex with a broad, shining fovea behind the antennae; palpi castaneous. Antennae stout, filiform, slightly longer than the head and thorax, infusate. Thorax immaculate; mesonotum punctate and somewhat nitidulous; metathorax rugulose, with the spiracular and pleural areas alone entire; petiolar area basally entire; apophyses wanting and spiracles orbicular. Scutellum black. Abdomen castaneous, dull and aciculate throughout; basal segment black, with the tubercles not prominent; anus whitish, with the apical segments sometimes infusate; terebra rather longer than the first segment. Legs black, with the tibiae, tarsi and apices of femora and trochanters, castaneous. Wings clouded; tegulae castaneous, radix pale; areolet pentagonal, with the external nervure obsolete. Length, 7–8 mm.

Marshall says this ♀ is allied to *Microcryptus abdominator* and *M. perspicillator*, but is larger, with immaculate antennae and dull abdomen. The females of *Microcryptus*, however, always have pale-banded antennae, and the present position is tentatively assigned to it solely on account of the abdominal aciculation, which most closely approaches that of *P. rugulosus* and some species of *Acanthocryptus*.

♂. Head dull and broader than the eyes; face somewhat strongly punctate, clypeus distinctly bidentate apically, mandibles red and basally broader than the length of the cheeks. Antennae hardly setaceous, infusate throughout and nearly the length of the body, with the scape cylindrical. Notauli wanting; costulae and sides of the transverse and rectangular areola weak; petiolar area dull and coriaceous, obsoletely discreted and reaching the centre; spiracles hardly circular. Abdomen black, with the anus and all the incisures castaneous; basal segment elongate and sub-linear, dull and coriaceous; post-petiole sub-striolate. Legs red, with base of all the trochanters, the strongly punctate posterior coxae, the hind tarsi and more or less of their femora, black. Wings ample and somewhat broad; stigma broad and piceous, nervellus intercepted below centre. Length, 6 mm.

This ♂, which is here for the first time noticed, agrees with the description of the ♀ in every particular.

Two specimens from the Black Wood of Rannoch (Marshall). My single male was swept from bushes in the Bentley Woods, near Ipswich, on 16th June, 1902. This species is quite unknown, at present, on the Continent.

13. *leucostigmus*, *Grav.*

Phygadeuon leucostigmus, Gr. I. E. ii. 667, ♀ (excl. var.); *Tasch. Zeits. Ges. Nat.* 1865, p. 24, ♀; *Thoms. O. E.* x, 953, ♂ ♀; *Kriech. Ent. Nachr.* 1892, p. 351, excl. ♂. (?) *Ischnocryptus geniculatus*, *Kriech. lib. cit.*, p. 343, excl. ♀.

Head of ♀ narrowed behind the hirsute eyes; cheeks longer than the base of the apically contracted mandibles; clypeus discreted with the granuliform apical teeth more inconspicuous in the ♀; face black.

Antennae black, with the post-annellus not shorter than the scape ; of ♂ nearly as long as the body, with the flagellar joints distinctly pubescent and the scape sub-globose and red ; of ♀ incrassate towards the obtuse apices, with the four basal joints red and the seventh to ninth white, the third nearly twice longer than the first. Thorax immaculate ; metathorax rugulose throughout and very dull, laterally distinctly transcostate ; areae complete, areola regularly hexagonal and in ♂ emitting the costulae before its centre ; petiolar area discreted, apophyses obsolete ; spiracles small, circular and obscure. Scutellum black. Abdomen nitidulous, black, with the second, third and base of the fourth segments pale red ; basal segment not curved laterally nor broadly explanate apically, carinate, strongly aciculate, centrally canaliculate and elevated ; ♀ with the anus dull white and the terebra very shortly exerted, about one third the length of the basal segment. Legs red, with the femora somewhat stout ; hind pair of ♀ usually, of ♂ broadly, with the apices of the femora and tibiae black, and the tarsi infusate. Wings clouded, with the basal half of the small and infusate stigma, which emits the short and curved radial nervure from beyond its centre, white as also is radix ; tegulae black ; discoidal cell inferiorly rectangular ; stigma of ♂ somewhat broad. Length, 4-5 mm.

This species somewhat resembles *P. variabilis*, but the petiolar area is sufficiently clearly discreted, and the tricoloured antennae of the ♀ will instantly distinguish it from all our other indigenous species of *Phygadeuon* : the broadly white stigma is very distinctive of both sexes, though Kriechbaumer has thrown doubt upon the true connection of Thomson's ♂, here described.

I can find no notice of this species' previous record from Britain. The only examples I have seen are a female, which I captured at the roots of *Statice limonium*, in the salt marshes on the banks of the Blyth, at Walberswick in Suffolk, on 26th August, 1898 ; and a second of the same sex taken at Mathon in Worcestershire, on 29th August, 1896, by the late Mr. Alfred Beaumont.

14. nanus, Grav.

Cryptus nanus, Gr. I. E. ii. 585, ♀. *Phygadeuon nanus*, Tasch. Zeits. Ges. Nat. 1865, p. 25 ; Brisch. Schr. Nat. Ges. Danz. 1882, p. 343, ♀ ; Thoms. O. E. x. 954, ♂ ♀.

Head very slightly narrowed behind the glabrous eyes, black, with the palpi and cheeks testaceous ; epistoma prominent ; clypeus narrow and distinctly discreted, with two apical teeth, granuliform in ♀ ; mandibles apically narrowed ; ♂ face with whitish pubescence. Antennae with post-annellus not shorter than the scape ; of ♀ stout, half length of body with the four basal joints pale red ; scape of ♂ citrinous beneath. Thorax immaculate ; metathorax sub-rugose, with complete and sharply defined areae ; areola regularly hexagonal ; petiolar area transversely wrinkled and not discreted ; apophyses small and acute, spiracles circular. Scutellum black. Abdomen nitidulous, black, with the apex of the long and slender first segment, the second excepting sometimes discally, and the basal half of the third, testaceous or dull red ; following segments piceous, with their apical margins paler ; post petiole aciculate, terebra hardly longer than the basal segment. Legs stout ; of ♀ entirely pale red ; of ♂ with the anterior trochanters white, and the hind coxae with their tarsi and apices

of their tibiae infusate. Wings somewhat clouded; radix and tegulae white; radial nervure emitted nearly from the centre of the dull testaceous stigma; areolet very small, spurious nervure wanting, nervellus antefurcal. Length, 2-3 mm.

The entire petiolar area and small, acute apophyses will render this small species sufficiently distinct.

It occurs in August throughout the northern half of Europe, and was introduced as British by Bridgman, who found it at Earham, near Norwich (*cf.* Entom. 1880, p. 53). I possess examples captured by Capron, at Shere, and by Wilson Saunders, at Greenings in Surrey, in June, 1871. It is probably overlooked, or mixed with *Hemiteles*, on account of its small size.

15. *brachyurus*, Thoms.

Phygadeuon brachyurus, Thoms. O. E. x. 955, ♂ ♀.

Black; eyes glabrous; antennae entirely black. Thorax with the petiolar area discreted and narrow; apophyses wanting. Abdomen centrally red; basal segment twice length of the terebra, dull and alutaceous, with the spiracles only just behind its centre; second segment very finely and alutaceously punctate basally. Legs red; femora not slender. Nervellus opposite. Length, 2-3 mm.

This species is closely allied to the last-described, but it is stouter, with the areolet larger, the vertex broader, the terebra and basal segment shorter, post-petiole broader, and the conformation of the petiolar area is very distinctive.

Bridgman sent both sexes of this species for identification to Professor Thomson (*cf.* Trans. Ent. Soc. 1886, p. 339) from Shere in Surrey and Eaton near Norwich; he also records it from Earham, in Norfolk; and Bignell has found it, early in September, at Crabtree in Devon. I have examples captured by Col. Verbury, at Woolhope, in Hereford, early in June; and by Wilson Saunders, at Greenings; but it has only occurred to me in August, on the Suffolk coast, at Southwold; and both sexes in the Blythburgh salt marshes, at the roots of reeds. On the Continent it has only been noticed in Sweden.

16. *cephalotes*, Grav.

Phygadeuon cephalotes, Gr. I. E. ii. 644; Tasch. Zeits. Ges. Nat. 1865, p. 41; Thoms. O. E. x. 956, ♂ ♀. *Ichneumon transfuga*, Gr. I. E. i. 158; Ste. Ill. M. vii. 139, ♀; *cf.* Wesm. Mém. couron. Ac. Belg. 1859, p. 17.

Head very broad, a little broader than the thorax, not narrowed vertically; black, with the palpi red; cheeks not longer than the mandibles, frons strongly punctate, clypeal teeth large, eyes glabrous. Antennae of ♂ stout and sub-setaceous, of ♀ filiform, with the six central flagellar joints red and the first shorter than the second. Thorax immaculate; metathorax isolatedly punctate and rugose, areola with no lateral costae; petiolar area discreted and centrally sub-nitidulous, spiracles circular. Scutellum black. Abdomen deplanate, very strongly nitidulous, obovate; black, with the sixth and seventh segments apically whitish; post-petiole gradually dilated, sub-quadrate, bicarinate and, together with the bases of

the following segments, rugosely sub-strigose; terebra hardly exerted. Legs normal, red; coxae excepting sometimes the anterior of the ♂, base and apex of the hind tibiae and in ♂ sometimes apices of the femora, with the posterior tarsi, black. Wings slightly clouded; tegulae black, radix stramineous. Length, 7-9 mm.

I. transfuga is rather larger, and Gravenhorst also mentions a ♂ with the anterior femora nearly entirely black. Concerning the typical ♀, he says of the sixth to the ninth antennal joints "*supra albidis*," but Taschenberg does not refer to white coloration and, on the contrary, divides it from *P. improbus*, var., by its bicoloured flagellum.

Rev. F. W. Hope took *I. transfuga* at Netley, in Shropshire; and the type form is said to occur throughout Europe, in June. There are, however, absolutely no specified British records of it, and I possess but a single female, in which I place but little faith, named by Dr. Capron, and taken by Mr. Albert Piffard at Felden, in Herts. Stephens, with his usual abandon, says it is rare in England, quotes Hope's record and adds the London district.

17. *flavimanus*, Grav.

Phygadeuon flavimanus, Gr. I. E. ii. 647; Ste. Ill. M. vii. 296; Tasch. Zeits. Ges. Nat. 1865, p. 23, ♂; Thoms. O. E. x. 956, ♂ ♀.

Head black; of ♂ with the internal orbits white, palpi flavous and mandibles centrally castaneous; frons strongly punctate, eyes glabrous, vertex not narrow; clypeus sub-discreted, obtusely tridentate apically. Antennae of ♂ slender, setaceous, as long as the body; of ♀ with the scape and two basal flagellar joints, of which the first is the longer, infusate, and the four following stramineous, the remainder suddenly deep black. Thorax immaculate; metathorax coriaceous, with the costae elevated and the basal areae entire; petiolar area oblique, deplanate, and distinctly discreted; apophyses wanting, spiracles large and circular. Scutellum black. Abdomen deplanate, not broader than the thorax, ovate, black; anus of ♀ narrowly white; basal segment elongate, carinate, with post-petiole parallel-sided and a little longer than broad; the following segments closely and obsoletely punctate; terebra shorter than the petiole. Legs normal, red; anterior femora sometimes centrally infusate, coxae and trochanters mainly black; hind coxae, base of their trochanters and centre of femora, black; hind tibiae basally or entirely, and their calcaria, ferrugineous. Wings somewhat clouded; radix stramineous, tegulae black; radial cell elongate. Length, 5-7 mm.

This species differs from the last-described in its apically elongate radial nervure, obsoletely punctate abdomen, and paler legs. *P. vulnerator*, which was indicated as its probable female by Taschenberg, is now considered quite distinct and related to *P. afflictor*, though its ♂ is still unknown.

Not uncommon; found in the south of England in the beginning of September (Stephens); one male, at Mousehold, near Norwich, in July (Bridgman); bred from *Emphytus serotinus* (Entom. 1882, p. 276).¹ It is

¹ Miss Chawner has called my attention to the frequency with which *Emphytus tibialis* falls a victim to the attacks of Ichneumonidae; she says (*in lit.* June 17th, 1906) that very often the larvae appear to die off prematurely before the parasite is fully grown, and so both host and parasite perish together; she has often seen quite young larvae die off after having been "stung," though no Ichneumonid effected its emergence.

said to occur on the Continent in May; I have found both sexes in the New Forest, the male near Brockenhurst in May, 1895, and the female in Lyndhurst in August, 1901; the female has also occurred to me on bushes in the Bentley Woods, near Ipswich, in June.

18. *variabilis*, Grav.

Phygadeuon variabilis, Gr. I. E. ii. 705, excl. typ. ♂; cf. i. Suppl. 707; Ste. Ill. M. vii. 394; Tasch. Zeits. Ges. Nat. 1865, p. 24, ♂ ♀; Thoms. O. E. x. 956, ♀; cf. Bridg. Entom. 1882, p. 275 et 1880, p. 53. (?) *P. campoplegoides*, Ratz. Ichn. d. Forst. ii. 124. Var. brachypt. *Ichneumon dromicus*, Gr. Mon. Ped. 39. *Pezomachus dromicus*, Gr. I. E. ii. 886. *Theroscopus dromicus*, Först. Wieg. Arch. 1850, p. 102, ♀. *Hemiteles dromicus*, Thoms. O. E. x. 996; Schm. Term. Füz. 1897, p. 560, ♂ ♀.

Head somewhat stout; clypeus narrow and sub-discreted, eyes glabrous; ♀ with palpi and centre of the mandibles ferrugineous. Antennae of ♂ black; of ♀ hardly longer than half the body, filiform, twenty to twenty-two jointed, with the seven basal joints, excepting sometimes the scape, red or ferrugineous and the remainder infusate. Thorax immaculate; areae complete; areola basally contracted and apically curved; petiolar area nitidulous, concave and not discreted; apophyses distinct and obtuse, spiracles circular. Scutellum black. Abdomen obovate, slightly narrower than the thorax and nitidulous; black, with segments two and three entirely red, the fourth sometimes basally, or in ♂ entirely red, and the seventh of ♀ more or less whitish; post-petiole rugosely striate, sub-linear, carinate and only a little broader than the petiole; second segment of ♂ obsoletely aciculate; terebra shorter than the basal segment. Legs with the coxae and trochanters black, sometimes in ♀ reddish; the anterior red, with the femora more or less broadly black basally; hind pair black, with base of the femora red in ♂ and centre of tibiae sometimes ferrugineous in both sexes. Wings clouded; radix and base of stigma white; tegulae infusate or ferrugineous. Length, 3-5 mm.

Thomson excludes Gravenhorst's ♂, probably on account of its discreted petiolar area, and makes no mention of it at all; he might, however, have included var. 2, which has the legs red, with the coxae infusate and tibiae immaculate, since Taschenberg says that in both sexes the petiolar area is without costae, and that it is the more typical form in point of frequency.

The female of this species is similar to *P. fumator*, but the radial nervure is basally clouded, the petiolar area centrally excavate, and the apophyses distinct though obtuse. From *P. dumetorum* the female may be known by the more slender legs, the slightly longer terebra, the obviously longer basal flagellar joints, and the whole body and legs are less pilose.

The brachypterous form, *Pez. dromicus*, is here for the first time associated with *Phyg. variabilis* (having been, certainly erroneously, placed in *Hemiteles*) on account of its stout antennae and the peculiar shape and convexity of the abdomen.

This species is very closely allied to *P. dumetorum*, but is smaller with the frons much more finely though not more closely punctate, the post-petiole less strongly strigose and somewhat broader, the ♀ antennae are

basally more broadly red, the apophyses more prominent; the ♂ is a more slender insect with the abdomen paler and less claviform than that of *P. dumetorum*.

An abundant species, both here and abroad, often flying in woods on hot days, from May to September; sometimes on *Scabiosa* and *Angelica* flowers. I have records from the London district, New Forest, Shropshire, Scotland, Maldon in Essex, Norfolk, Exminster, Land's End, Yorkshire, Huddersfield, Lyndhurst, Abinger Hammer, Shere, Greenings and Chobham. Elliott has sent it me from Hayburn Wyke; and I have found it in Suffolk, at Shrubland Park, Barton Mills, Henstead, Finborough Park, Bentley Woods and Tuddenham Fen. It has also been taken at Rossbeigh, in Co. Kerry, by Donisthorpe, and Kingsdown, in Kent, by Sladen. Thomson says it has been bred from dipterous (probably Tachinid) pupae. The brachypterous form is not common and I have not seen its male; Piffard has twice taken it at Felden in Herts.; late in August, 1900, Butler sent it to me from Abinger Hammer in Surrey; and I have recently examined a specimen which Rev. O. Pickard-Cambridge bred from the eggs of some Epeirid spider in Dorsetshire.

19. *assimilis*, Grav.

Phygadeuon assimilis, Gr. I. E. ii. 711; Ste. Ill. M. vii. 301; Tasch. Zeits. Ges. Nat. 1865, p. 44, ♂. (?) *P. fumator*, var. 9, Gr. I. E. ii. 695, ♂. (?) *Pezomachus Gravenhorstii*, Ratz. Ichn. d. Forst. i. 154; *Theroscopus Gravenhorstii*, Först. Wieg. Arch. 1850, p. 100; *Hemiteles Gravenhorstii*, Schm. Term. Füz. 1897, p. 559, ♀. Var. *Theroscopus inaequalis*, Först. Wieg. Arch. 1850, p. 97, ♀.

Head black and palpi red; antennae immaculate, half as long again as the body. Metathorax irregularly rugose; areola small, sub-quadrate, with the basal costa obsolete; centre of the petiolar area coarsely and transversely rugose, not discreted. Scutellum black. Abdomen narrower than thorax, oblong-ovate; black with segments two, three and more or less of the fourth, red; basal segment canaliculate, with weak carinae and tubercles; post-petiole foveolate and gradually dilated towards the apex. Legs normal, black; trochanters entirely, tibiae except apices of the hind ones, tarsi except apices of the hind ones and all the onyches, red; apices of the anterior femora ferrugineous. Wings often slightly clouded; radix flavous, tegulae black. Length, 7-8 mm.

This ♂, which appears to have only been shortly described by Gravenhorst and Taschenberg, is said to resemble *P. fumator*, but is more elongate, with the antennae longer and the legs differently coloured. It is impossible to conjecture its true position from the above meagre description, and it would, perhaps, be better to omit it from the British list, if such a course were permissible. I do not find that it has been noticed on the Continent since 1829.

Gravenhorst then took it in Germany, on the flowers of *Pastinacea sativa*, in June and August; Stephens says it was not common in June, about London, and Marshall records it (Entom. 1872-3, p. 432) as having been taken by Francis Walker, in the Isle of Man, in 1869.

?♀. Head black, with the palpi red; smooth, with the face rugose. Antennae piceous, with the six basal joints fulvous; three basal flagellar joints elongate, second longer than first. Thorax dorsally red, with the

pro- and meso-pleurae darker; mesonotum subglabrous, with obsolete notauli; metathorax smooth and shining with the petiolar area rugose, its basal costa centrally wanting; apophyses prominent. Abdomen finely and diffusely punctate and pubescent; basal segment fulvous, shorter than terebra, spiracles obsolete, centrally canaliculate, apically explanate and broad; second red, with a piceous fascia; third similarly marked; remainder piceous, apically rufescent; seventh whitish. Legs fulvous, with the hind femora and tibiae darker. Wings punctiform. Length, 4 mm.

The variety *inaequalis* appears to differ only in the coloration of the second segment.

This species certainly belongs to *Phygadeuon*, rather than *Hemiteles*, as is exemplified by its stout antennae and thick build. Its relationship with the present male is, however, purely tentative. It is quite distinct from *Phygadeuon* (*Stibentes*) *Gravenhorsti*.

This female has for long stood in our list, but it appears to be rare with us, since I have failed to discover any records; but in the middle of October, 1897, I captured one specimen of the type form (not noted in Britain before), in a hole upon Foxhall Plateau, near Ipswich. Elsewhere it has only been found in Germany, where Ratzeburg bred it from the Ophonid ichneumon, *Henicospilus merdarius*, Grav.

20. *dumetorum*, Grav.

Phygadeuon dumetorum, Gr. I. E. ii. 669; Tasch. Zeits. Ges. Nat. 1865, p. 24; Thoms. O. E. x. 957, ♂ ♀.

Head coarsely punctate, face prominent; clypeus not discreted, of ♂ apically bidentate; mouth of ♀ red and vertex of ♂ sub-dilated behind the eyes. Antennae filiform, black; of ♂ slender, not longer than the body, scape a little shorter than the third flagellar joint and often entirely or beneath ferrugineous, twelfth to fourteenth joints with elevated lines; of ♀ stouter, half length of the body, basally fulvous or ferrugineous, with the sixth and seventh sometimes stramineous, and the first flagellar joint evidently shorter than the second, though hardly shorter than the scape. Thorax coarsely punctate; metathorax rugose, with complete areae; areola emitting costulae behind the centre, of ♀ semilunate, of ♂ distinctly hexagonal; petiolar area reaching beyond the centre, not discreted and laterally indeterminate; apophyses obtuse, spiracles small and circular. Scutellum black. Abdomen not broader than the thorax, nitidulous; black, with the second and third segments red, and in ♂ also the fourth; seventh white in ♀; post-petiole slightly elongate, carinate, canaliculate, rugosely punctate or rimose, with prominent spiracles; terebra not longer than the post-petiole. Legs fulvous or red; hind pair with the tarsi, the apices of femora and of tibiae, and sometimes the coxae basally, infusate. Wings hardly clouded; costa with a sometimes obsolete white dot, radix flavous; tegulae ferrugineous, of ♂ black. Length, 4-5 mm.

The coarsely punctate head and thorax, sub-lunate areola, and laterally indeterminate petiolar area will distinguish this species, which shares the obovate abdomen, short terebra, rimose post-petiole, entire petiolar area and the number of antennal joints with *P. variabilis*.

It should further be noted that the basal segment is always black to its apex, which is not strongly explanate, with the post-petiole very strongly and evenly aciculate throughout; it is the petiole which is rimose; the ♀ antennae are two-thirds the length of the body, generally with the four basal flagellar joints and part of the scape fulvous: I have seen no example with the central joints paler, which character would point to affinity with *Microcryptus*; the terebra is nearly as long as the basal segment, the wings are comparatively somewhat small and subinfusate, and the legs are very variable in colour.

An abundant species both here and abroad; I have records from early June to the beginning of September, but it is commonest in July and August on *Angelica* flowers. Bickleigh (Bignell); Brundall, in May (Bridgman); New Forest and Offchurch Bury, near Leamington (Chitty); Abinger Hammer (Butler); Felden (Piffard); Kingsdown and Ripple, near Dover (Sladen); Sutton Coldfield (W. Ellis); both sexes at Redland, near Bristol (Charbonnier); Deal in May and Greenings (W. Saunders); Shere (Capron); Scarboro' (Elliott); Tostock and Benacre Broad (Tuck); Lincoln, a ♀ attracted to artificial light in garden (Musham). It has occurred to me on bushes in woods, especially on oak and birch, on flowers of *Chaerophyllum*, and in greenhouses, at Ryde, New Forest, Blean Woods in Kent; at Ipswich, Felixstowe, Bentley Woods, Eye, Foxhall, Dunwich, Tuddenham Fen, Brandon and Farnham in Suffolk. In Dover, on 27th April, 1896, I took a very early ♀ on a house window. Giraud once bred it from *Stratiomys Cameleon*, but it probably also preys upon much commoner Diptera.

21. *exiguus*, Grav.

Phygadeuon exiguus, Gr. I. E. ii. 666; Ste. Ill. M. vii. 298; Tasch. Zeits. Ges. Nat. 1865, p. 32, ♀; Thoms. O. E. x. 958, ♂ ♀.

Head black, with the palpi white and the mandibles red-marked; clypeus sub-discreted, with the basal foveae and apical teeth very distinct; genal costa continuous, eyes glabrous; face of ♂ with dense white pubescence. Antennae of ♀ with the basal half of the flagellum and the scape beneath flavidous; of ♂ with the post-annellus rufescent beneath and hardly longer than the scape, which is white beneath. Thorax immaculate, pronotum not punctate; metathorax sub-nitidulous, not rugosely punctate, with complete areae; areola transverse and basally rounded, petiolar area discreted; apophyses small, spiracles imperfectly circular. Scutellum black. Abdomen ovate, deplanate, as broad in ♀ as the thorax, nitidulous; flavidous, with the first segment piceous and longer than the terebra, slender and elongate; sometimes the central segments laterally, and always anus of ♂, infusate; post-petiole a little longer than broad, only slightly broader than the petiole, sub-carinate, centrally deplanate and glabrous. Legs normal, flavidous; hind tarsi, with base and apex of their tibiae, infusate; ♂ with the anterior trochanters white. Wings slightly clouded; radix white, tegulae piceous; basal abscissa of the radial nervure shorter than the breadth of the stigma, and about one-third shorter than the apical abscissa. Length, 4-5 mm.

This species differs from all the following in its apically much longer

radial nervure, the conformation of its petiole, distinct clypeal teeth, impunctate pronotum and the white ♂ markings.

A very common insect throughout the summer months, and usually captured flying about bushes on hot days; Gravenhorst took it as late as 1st October. About London and near Hereford (Stephens); not uncommon at Norwich (Bridgman); Nunton in Wilts (Marshall); Bickleigh and Exeter (Bignell); Oxshott and Blackheath (Beaumont); Greenings (W. Saunders); Nethy Bridge in July (Yerbury). I have found it in the New Forest, Gosfield in Essex, Wicken Fen in Cambs.; at Claydon bridge on *Angelica* flowers, Brandon and the Bentley Woods, in Suffolk.

22. *mixtus*, Bridg.

Hemiteles mixtus, Bridg. Trans. Ent. Soc. 1883, p. 148, ♀. *Phygadeuon mixtus*, Bridg. *lib. cit.* 1886, p. 339.

Head smooth and shining, with white pubescence, sub-buccate behind the eyes; black, with mouth rufescent; clypeus discreted and apically rounded. Antennae short and stout, slightly longer than half the body, with their basal half rufescent; basal flagellar joint thrice, the second a little, longer than broad. Thorax smooth and shining, with white pubescence, a little longer than high; notauli indistinct; metathoracic areae well defined, with areola transversely sub-hexagonal; petiolar area discreted, reaching beyond the centre; apophyses distinct. Scutellum black. Abdomen glabrous and nitidulous, ovate, with the apical half setiferous; segments two and three red, the latter centrally or with its apical half infusate; basal segment elongate and rather longer than the hind coxae and trochanters; petiole parallel-sided and half the apical breadth of the gradually explanate post-petiole; following segments transverse; terebra two-thirds the length of the abdomen. Legs slender and red; sometimes with the hind femora centrally, and the apical joint of the tarsi, with apices of all the hind tarsal joints, infusate. Wings basally pale; stigma piceous; lower angle of the discoidal cell beneath centre of the externally incomplete areolet. Length, $3\frac{1}{2}$ mm.

The legs and wings of this female resemble those of *Hemiteles*, and induced Bridgman to at first place it in that genus, from which he subsequently transferred it to *Phygadeuon*, after having submitted it to Professor Thomson. Bridgman makes no mention of the radial nervure; but the ovate abdomen, elongate basal segment, discreted petiolar area, and smooth head appear to ally it with *P. exiguus*. This species appears to me to much more nearly represent the macropterous form of *P. rotundipennis* than *P. fumator*, as was suggested by Bridgman, but it differs materially in the thoracic sculpture and relative length of the flagellar joints.

This species has been recorded from Brundall near Norwich, Shere in Surrey, and early in September at Tunbridge Wells. It appears to be an uncommon species, and I have seen but two examples; one captured by Bignell at Bickleigh in Devon, in the middle of September, 1884, and another which I swept by the Ouse at Brandon in Suffolk, on 7th of June, 1903. Schmiedeknecht has found it in Thüringen.

23. *ambiguus*, Grav.

Phygadeuon ambiguus, Gr. I. E. ii. 703; Tasch. Zeits. Ges. Nat. 1865, p. 34, ♂; Brisch. Schr. Nat. Ges. Danz. 1879, p. 342, ♂ ♀.

Head almost cubical, black; clypeus discreted and apically obtusely bidentate; palpi red, face with grey pubescence. Antennae of ♂ entirely black or with first three joints ferrugineous beneath; of ♀ with the five basal flagellar joints, and the scape beneath, red. Thorax immaculate; metathorax coarsely punctate, areae complete and finer in ♀; areola broader than long, hexagonal and somewhat rounded basally; petiolar area nearly vertical, longitudinally rugose, of ♀ and usually of ♂ discreted; apophyses wanting, spiracles circular. Scutellum black. Abdomen black, of ♀ lanceolate with segments two and three longer than broad; segments two to four and in ♂ more or less of the two following red, the apical ones in ♂ with red-yellow and in ♀ with white margins; basal segment sub-linear, rugose, with normally prominent spiracles, a little dilated apically, broader in ♀; post-petiole smoother, aciculate with obsolete carinae; second segment very feebly aciculate, with isolated punctures; terebra half the length of the basal segment. Legs red, with the coxae and trochanters black; anterior femora basally, the hind ones either entirely or apically and beneath, together with their tarsi and base and apex of tibiae, black; ♀ with the anterior coxae red beneath. Wings hyaline; radix flavous, tegulae black. Length, 7-8 mm.

Gravenhorst mentions a ♂ with the second to fourth segments castaneous throughout and the basal a little narrower; and Brischke records an analogous female.

This species, which figures as insufficiently described in the latest Continental enumeration, has only been recorded from three German localities. It was introduced as British by Desvignes (Cat. 60) in 1856; but it is nearly certain that he incorrectly determined his representatives. I have seen nothing quite like it, it is mentioned by no later observer and has not been bred. It is, however, just possible that a single pair of Phygadeuons in my collection, which Bignell found investigating worm-wood in Devonshire and Bridgman considered undescribed, may be referable to the present species.

24. *Marshalli*, Bridg.

Phygadeuon procerus, var. 2, Gr I. E. ii. 724, ♂. *P. Marshalli*, Bridg. Trans. Ent. Soc. 1883, p. 141, ♂. (?) *Theroscopus ingrediens*, Först. Wieg. Arch. 1850, p. 96, ♀; *Hemiteles ingrediens*, Schm. Term. Füz. 1897, p. 558, ♀.

♂. Head black, dull and closely punctate; not buccate behind the eyes. Antennae either entirely dark ferrugineous, or rufescent beneath with the scape black. Thorax dull, finely and closely punctate, with distinct notauli; metathorax with two irregular, curved, transverse costae; areae incomplete, areola laterally obsolete. Scutellum black. Abdomen cylindrical, black; segments two to three red with infusate fasciae before their apices, that on the second the broader and sub-bisected centrally; the three following segments narrowly red-margined; basal segment but little narrower at the base than at the punctate-aciculate

apex, with spiracles not prominent and a little behind the centre ; second segment twice longer than broad and more strongly punctate than the following transverse segments. Legs slender, red ; coxae, excepting sometimes the apex of the front ones, together with the base of the hind trochanters, their tarsi and the apices of both their tibiae and femora, black ; intermediate trochanters infusate. Wings hardly clouded ; radix and tegulae stramineous. Length, 7 mm.

Bridgman says this ♂ differs from the genuine *P. procerus* in its incomplete metathoracic areae, narrower post-petiole and in the abdominal coloration. He makes no mention of clypeal teeth, however, and its position is consequently to a great extent a matter of conjecture.

This male appears to be very little known, and I have seen nothing like it. It is said to occur in central Europe towards the end of July. Bridgman refers to it two males in Marshall's collection captured at Bugbrook, near Northampton.

?♀. Head black, with palpi and mandibles red, the latter apically black ; whole head, including cheeks and clypeus, rugose ; pubescence short and fine. Antennae with the four or seven basal joints fulvous and the remainder piceous ; basal flagellar joint slightly longer than the second, fifth sub-quadrate. Pro- and meso-notum red, their pleurae piceous ; metathorax black and rugose, with the spiracular area distinct and apophyses conspicuous. Abdomen glabrous, with diffuse pubescence ; whole of second and third, apices of the first and remaining segments, fulvous ; the sixth and seventh obsoletely whitish ; second alutaceous, third laterally piceous ; terebra shorter than basal segment, which is narrow throughout, with spiracles prominent and post-petiole canaliculate. Legs fulvous, with the hind tibiae apically piceous. Length, 5 mm.

P. Marshalli is certainly the male of some *Theroscopus*, and, although affinity with the present species is but conjectural, the latter's position here is rendered natural by its stout antennae, posteriorly contracted head, basally red flagellum, normal petiole, discreted petiolar area, etc. There appear to be no British records, though it has long stood in our catalogues, and the only example I have seen Piffard took at Felden in Herts. It has only been noticed elsewhere in Germany.

25. *hercynicus*, Grav.

Phygadeuon hercynicus, Gr. I. E. ii. 709 ; Tasch. Zeits. Ges. Nat. 1865, p. 29, ♀ ; Thoms. O. E. x. 958, ♂ ♀.

Head cubical, not narrowed posteriorly ; genal costa inflexed, eyes glabrous ; ♀ with mandibles centrally red. Antennae black, flagellum basally attenuate ; of ♀ sub-filiform, shorter than half the body, with the third to fifth joints alone red. Thorax immaculate ; pronotum and metapleurae closely punctate ; notauli short but distinct ; metathorax smooth and convex, with sharply defined areae ; areola sub-hexagonal, emitting the costulae from its centre ; petiolar area discreted and sub-parallel-sided ; apophyses small, spiracles circular. Scutellum black. Abdomen strongly nitidulous, lanceolate and narrower than the thorax ; black, with segments two to four red, the fifth and usually a fascia on the fourth infusate ; anus of ♀ compressed and white ; basal segment sub-linear,

post-petiole distinctly dilated apically, deplanate, glabrous, sub-carinate and a little longer than broad; terebra slightly longer than the basal segment, with black valvulae. Legs red, with the coxae and trochanters alone black. Wings sub-hyaline; radix white, tegulae black, nervellus antefurcal; radial nervure not thrice longer apically than basally. Length, 4-6 mm.

This species is very like *P. fumator* in its punctate pronotum and metapleurae, but the abdomen has the post-petiole sub-quadrate and broader, the ♀ anus compressed and the terebra longer, with the hind femora more strongly punctate; the ♂ antennae, tegulae and mandibles are black, with the areola longer and emitting central costulae.

P. hercynicus was first mentioned from Britain, with no note of its being an addition to our fauna, by Bridgman (Trans. Norf. Soc. v. 613); and most of the records under *P. nitidus* probably refer to it, since it is a common species on *Angelica sylvestris* flowers in marshy places, at least throughout the southern half of Britain, from the end of August to the first week of October. Guestling, in Sussex (Bloomfield); Redland, near Bristol (Charbonnier); Copthorne Common, Surrey (W. Saunders); Plumstead in July (Beaumont); Lyndhurst (Adams); Wicken Fen and Tostock (Tuck); Eaton, Heigham and Brundall (Bridgman); Devon (Bignell). I have invariably found it upon carrot and *Angelica* flowers, at Crookham in Berks., Felden in Herts., Horsham St. Faith in Norfolk; and in Suffolk at Claydon bridge, Henstead marsh, Beccles, Barnby Broad, Foxhall and Eye. I cannot find that it has yet been bred.

26. *brevitarsis*, Thoms.

Phygadeuon brevitarsis, Thoms. O. E. x. 959, ♂ ♀.

Black; abdomen centrally broadly, with the femora and tibiae, red; terebra slightly shorter than the basal segment. Length, 4-5 mm.

This species is shortly diagnosed as above by Thomson, who adds that it is very like the last-described, but that its head is less cubical, the flagellum pilose and obscurely red towards the base, with the joints shorter, and that the terebra is obviously shorter than the basal segment.

Professor Thomson identified an example of this species sent to him by Bridgman, who had considered it to be simply a variety of *P. nitidus*, and who took it at Earham and Wroxham, in Norfolk, in August and September. The only specimen I have seen is one, named by Professor Brauns, which I beat from *Pinus sylvestris* in the Bentley Woods, near Ipswich, on 2nd April, 1899, probably after hibernation.

27. *nitidus*, Grav.

Phygadeuon nitidus, Gr. I. E. ii. 708, cf. i. Suppl. 708; Ste. Ill. M. vii. 300; Tasch. Zeits. Ges. Nat. 1865, p. 30, ♀; Thoms. O. E. xiii. 1404, ♂ ♀. (?) *P. diaphanus*, Gr. I. E. ii. 737; Tasch. Zeits. Ges. Nat. 1865, p. 40, excl. ♀; cf. Kriech. Ent. Nachr. xviii. p. 364.

Head cubical and not narrowed behind the glabrous and oval eyes; vertex hardly emarginate and narrower in the ♂; frons strongly and not very closely punctate; clypeus apically bidentate in the centre; cheeks

sub-buccate and somewhat short; mandibles stout and piceous, palpi infusate. Antennae short and black; of ♂ attenuate towards the apices, of ♀ shorter than half the body, with the flagellum red and hardly attenuate basally, its first joint slightly longer than the second and a little longer than the scape, the fourth not transverse. Thorax sub-cylindrical, immaculate, nitidulous and pubescent; pronotum basally striolate, with elongate epomiae; mesonotum, especially in the ♂, sparsely but not finely punctate, with short and deeply impressed notauli; mesosternum sparsely but distinctly punctate laterally, sternaui deep and hardly abbreviated posteriorly; metathorax not rugose, with complete areae, of which the basal is transverse and narrowed behind, and the petiolar does not reach beyond the centre; costulae entire. Scutellum black; of ♀ deplanate, sub-glabrous, with the basal fovea transversely linear; of ♂ punctate and more convex. Abdomen lanceolate, red and sub-compressed apically, with segments six to eight of the ♂ black; basal segment as long as the slender terebra, sub-arcuate, deplanate, black, its dorsal carinae short and spiracles sub-prominent; post-petiole quadrate, of ♀ punctate-alutaceous, of ♂ rugosely striate; second segment of ♀ smooth and sub-quadrate, of ♂ isolatedly punctate. Legs somewhat stout, black; anterior femora except in ♂ basally, tibiae and tarsi, with the mutic hind tibiae except in ♂ at base and apex, red. Wings sub-hyaline, radix white, tegulae black; stigma sub-triangular and nigrescent, pale at the base and apex, emitting the radial nervure behind its centre, the latter twice shorter basally than the slightly curved apical abscissa; areolet regular; nervellus oblique and a little ante-furcal. Length, 7–8 mm.

This species closely resembles *P. hercynicus*, but it is nearly twice larger, with the post-petiole less smooth, bicarinate, centrally canaliculate, and somewhat dull, the hind femora are sometimes black (though not so described by Gravenhorst) and the abdomen is broader and less compressed.

Kriechbaumer (Ent. Nachr. 1892, p. 364) says *P. diaphanus* occurs in August and September, has the metathoracic areola obsolete and is most closely allied to *P. cephalotes* and *flavimanus*.

It is not an uncommon species in north and central Europe, where it occurs in August on umbelliferous flowers. Taken about Netley in Shropshire (Hope); the female in Darenth Wood in June and in Salop (Stephens); Earlham, Eaton and Heigham, in September (Bridgman); Bickleigh, in the middle of September (Bignell). I am of opinion that most of the British records refer to *P. hercynicus*, though one or two of the females found by Capron about Shere and three males, which I took on *Angelica* flowers at Claydon bridge, near Ipswich, in September, 1898, appear to be correctly here placed.

28. *ovatus*, Grav.

Phygadeuon ovatus, Gr. I. E. ii. 668; Ste. Ill. M. vii. 298; Tasch. Zeits. Ges. Nat. 1865, p. 32, ♀; Thoms. O. E. x. 959, ♂ ♀. Var. *Cryptus ruficornis*, Gr. I. E. ii. 574; *Hemiteles ruficornis*, Thoms. O. E. x. 971; Schm. Term. Füz. 1897, p. 515, ♀.

Head black, with the mouth rufescent; clypeus sub-discreted, genal costa inflexed, eyes glabrous. Antennae of ♂ short, with the post-annellus hardly longer than the scape, of ♀ filiform with the seven basal joints red.

Thorax immaculate, with the notauli short and distinct; metathorax shining and not rugose, with complete and well-defined areae; areola basally rounded, petiolar area discreted and nearly parallel-sided; apophyses acute and spiracles circular. Scutellum black. Abdomen hardly narrower than the thorax, ovate; black, of ♀ with segments two and three castaneous-red and the sixth and seventh narrowly white-margined; basal segment apically sub-rectangular, as long as the terebra; post-petiole centrally sub-canaliculate, laterally sub-aciculate, with distinct and convergent dorsal carinae; second segment glabrous, with isolated punctures. Legs red; hind pair with the tarsi infusate and apices of femora and of tibiae black. Wings hardly clouded; radix flavidous, tegulae infusate, nervellus antefurcal; radial nervure not thrice longer apically than basally. Length, 5 mm.

Gravenhorst describes a ♀ variety with the legs, excepting only the hind tarsi, red; and his *ruficornis* also has all the legs, excepting the upper side of the hind coxae and their tarsi, red, together with the fourth segment and five basal antennal joints; the terebra, too, is slightly shorter than in the type form.

I leave *C. ruficornis* in the position assigned it by Taschenberg for two reasons: firstly because he examined the actual Gravenhorstian types and had first-hand opportunity of comparing the species; secondly because it would probably be incorrect to record it from Britain in the position of a good species, since Marshall simply followed Taschenberg's synonymy, and I can find no indigenous records of this particular variety.

From the last three small species this may be known by its strongly coarctate body, broader and apically dilated petiole, the three ♀ basal flagellar joints with the femora and tibiae red, and in the ♂ by its black abdomen, short antennae and post-annellus.

Not an uncommon species on the Continent, but apparently rare with us. Stephens says it used to be not common near London in June; and Bridgman records it from Earls Ham, near Norwich, in August. I have seen but two females, both taken by Piffard at Felden in Herts. It has not yet been bred.

29. *fumator*, Grav.

Phygadeuon fumator, Gr. I. E. ii. 687, excll. varr. 4, 5, 9 (et 7, ♂), cf. i. Suppl. 707; Ste. Ill. M. vii. 300 (part); Tasch. Zeits. Ges. Nat. 1865, p. 27; Thoms. O. E. x. 960, ♂ ♀; Holmgr. Sv. Ak. Handl. 1854, p. 56, ♀. Var. *P. troglodytes*, Gr. I. E. ii. 713; Tasch. Zeits. Ges. Nat. 1865, p. 27, ♂.

Head sub-cubical, black with the palpi stramineous and mandibles centrally red; clypeus of ♀ discreted and obtusely bidentate apically, of ♂ entire and apically truncate. Antennae of ♂ setaceous, nearly length of the body, with scape red beneath; of ♀ sub-incrassate towards the apices, half length of the body, with the basal joint or joints pale beneath. Thorax immaculate; notauli sub-punctiform; metanotum sub-punctate, with complete areae, of ♀ rugulose; areola hexagonal and contracted basally; spiracles circular and apophyses of ♀ alone distinct. Scutellum black. Abdomen nitidulous, of ♂ oblong, of ♀ ovate; basal segment black, aciculate, carinate and longer than the terebra, of ♂ rarely apically red; second and third segments red, rarely apically infusate in ♂, the

latter generally apically black in ♀ ; the fourth black, rarely basally or entirely red in ♂ ; remainder black ; post-petiole of ♂ elongate, of ♀ broader. Legs red, more or less nigrescent ; generally with the coxae and trochanters, especially the hind pair, partly or entirely black ; hind tarsi and apices of their tibiae infusate. Wings not clouded ; radix and tegulae whitish, latter in ♂ sometimes infusate. Length, 3-4 mm.

This species agrees with that next described in the sculpture of the thorax, conformation of the basal segment and puncturation of the hind femora, but the head is less cubical, the front tibiae hardly at all inflated, the three basal flagellar joints evidently longer and the epipleurae of the third segment extend nearly to its apex.

The legs vary greatly in colour : the hind tibiae may be black at both base and apex (Gr. var. 1), sometimes with their femora concolorous (var. 2), combined occasionally with the anterior femora more or less basally infusate (var. 6) ; dark femora usually combine with dark tibiae ; Gravenhorst's var. 3 is a male with flavous trochanters and var. 8 a female with the second segment alone obscurely red and the tegulae black. Quite possibly some of these varieties are referable to the three following species.

So variable, indeed, is this species both in structure and in coloration, that Bridgman says he separated the specimens in his collection into seventeen female and twenty male varieties, of which Thomson's species *inflatus*, *scaposus* and *dimidiatus*, and Gravenhorst's *troglodytes*, which has the hind legs entirely and the abdomen mainly black, were part (*cf.* Trans. Norf. Soc. 1893, p. 607).¹ If, however, the allied species be eliminated this will be easily recognized.

P. fumator is one of the most abundant of all British insects, more especially at the roots of *Aira caespitosa*, where I have repeatedly taken twenty females in an hour, and even at those of ordinary field-grasses throughout the winter. During the warmer months it occurs on the flowers of *Pastinacea sativa*, *Angelica sylvestris*, *Mercurialis perennis*, and the var. *troglodytes* on those of *Rosa centifolia* ; it is often discovered in the great tufts of *Carex paniculata* in marshes, in fact there is not a month in the year when I have not found it in one situation or another, by beating white poplar, sweeping reeds (often at dusk), in greenhouses or upon house-windows ; it is commonest in August, and only the males, which of course do not hibernate, are found in June. When alarmed it very often, at least in the winter, feigns death, like *Dicaelotus*. It has been recorded from Netley in Shropshire, Scotland, Norfolk, Devon, Plym bridge, Ivy-bridge and Bickleigh, Land's End, Yorkshire, Isle of Man and Maldon in

¹ I possess some of Bridgman's correspondence upon the subject, and it is instructive in indicating those characters which may be expected to vary least. Writing to Fitch in 1881, he says, "they vary from legs entirely red to only part of the front ones red, antennae black to first four or five joints red, abdomen second and third segments red to almost entirely black, the areae of the metathorax vary too in shape, but the shape of the head, punctures and pubescence on the abdomen as well as on the head are constant through all." In 1890 he wrote to Marshall : "*Phygadeuon fumator*, Gr., has always been a difficulty with me. Thomson has made twelve species of it ; I can only detect five of Thomson's species, and those not very satisfactorily—his descriptions are so very short. I find that the ♀ ♀ have the eyes in three distinct conditions : distinctly pubescent, obsoletely pubescent and nude ; the third joint of the front tarsi varies, length of joints of flagellum varies, sculpture of first segment and puncturing of the mesonotum. After I had separated the ♀ ♀ (I made ten or eleven distinct species), I looked over the ♂ ♂, but my inspection led me to the conclusion that Thomson had reversed the ♂ ♂ of *P. inflatus* and *P. fumator*."

Several species and genera are mixed under this name in the British Museum collection.

Essex. I have received examples from Abinger Hammer, Blackheath, Whitby, Botusfleming in Cornwall, Felden in Herts, Reigate, Shere, Greenings, Nethy Bridge; Tomlin has taken both sexes in the Bentley Woods, and Tuck at Bury St. Edmunds, Tostock, Bungay and Aldeburgh, in Suffolk. It has occurred to me at Brede, Crowhurst, Peppering, Battle, Westfield, Beaufort Park and Sedlescombe, in Sussex; in the New Forest at Lyndhurst, Crookham in Berks., Horning and Winterton in Norfolk, Ryde and Huntingfield, near Faversham. In Suffolk it is common at Foxhall, Claydon, Kenton, Monks' Soham, Barton Mills, Coddenhams, Assington, Eye, Finborough, Tuddenham, Southwold, Brandon, Bawdsey, Blakenham, Ipswich, Kentford and Nacton. Considering its prevalence, it has very rarely been bred, though Parfitt raised it from *Mamestra brassicae*, and Cameron is said to have bred the var. *troglodytes* from *Emphytus serotinus* (Entom. 1882, p. 276). On 3rd May, 1899, Keys sent me a male of this species, which he had just reared from a rotten mangold from Efford Farm, near Plymouth, and with it was the leaf from which it had emerged containing, however, no trace of either host or cocoon. I suspect it of preying mainly upon Anthonomyid diptera; Chitty has bred it from a dipterous puparium found in carrion.

30. *inflatus*, Thoms.

Phygadeuon inflatus, Thoms. O. E. x. 959, ♂ ♀.

Head cubical; ♂ face with grey pubescence and white palpi. Antennae black, with the three basal flagellar joints not elongate, of ♂ with the scape flavidous beneath. Thorax immaculate; notauli sub-punctiform, pronotum and metapleurae coarsely punctate; metathorax punctulate and sub-rugose, with the petiolar area basally dilated; areola transverse, emitting the costulae from behind the centre. Scutellum black. Abdomen centrally rosy; petiole basally depressed, broader than high, short; post petiole not rimose, of ♂ broad and nearly transverse with no carinae; third segment with the epipleurae hardly reaching beyond its centre; terebra shorter than the basal segment. Legs rosy; front tibiae inflated and the hind femora densely and finely punctate; ♂ with the anterior trochanters pale flavous. Wings not clouded; ♂ tegulae white. Length, 3-4 mm.

This is by no means a rare species in Britain, though for so long mixed with *P. fumator*; it was first detected by Bridgman in Norfolk, and its range extends throughout northern Europe. Adams has found it in his garden at Lyndhurst in the New Forest, Piffard at Feldon in Herts., Beaumont at Blackheath, and Tuck at Benaere Broad and Bungay in Suffolk, where also it has fallen to my net in the Bawdsey marshes, the salt marshes of the Orwell near Ipswich and near Southwold, at the latter of which localities the males were abundant on the long and rank grass of the boat-pond at the beginning of June, 1905. It especially appears to favour boggy spots, since I have swept both sexes in Wicken sedge fen and beaten the male from whitethorn blossoms in Burwell Fen, in Cambs., in June. It probably hibernates in the perfect state, since nearly all my dates are in May, June and September.

31. *scaposus*, *Thoms.*

Phygadeuon scaposus, Thoms. O. E. x. 961, ♂ ♀.

Black ; abdomen centrally, antennae basally, and the legs, red ; post-annellus shorter than the cylindrical scape ; terebra slightly longer than half the basal segment. Length, 3-4 mm.

Thus alone Thomson describes his new species of the *P. fumator* group, adding that it differs from its immediate allies in its broad peristomium, long and stout mandibles, the antennae of the ♂ short, with their post-annellus hardly longer, and in ♀ evidently shorter, than the cylindrical scape. As a matter of fact, I find the relative length of the basal flagellar joints quite a good and sufficient distinction.

This species, which has only been noticed elsewhere in Sweden, was introduced as British by Bridgman on the strength of specimens found by him in Norfolk. It is not, however, rare with us, but at present is much mixed in collections with *P. fumator*. All the specimens I have seen were taken in July and September : Bury St. Edmunds, Bungay and Finborough Park on *Angelica* flowers (Tuck). Felden in Herts., one female (Piffard). I have only found it at Tunstall and Alderton in Suffolk, where it affected the flowers of *Foeniculum vulgare*.

32. *dimidiatus*, *Thoms.*

Phygadeuon dimidiatus, Thoms. O. E. x. 963, ♂ ♀.

Black ; abdomen centrally, antennae basally, and the legs, red ; terebra shorter than the basal segment. Length, 3 mm.

This species is even more insufficiently described than the last and is very closely allied to it and to *P. fumator*, but the antennae have the basal half red ; the terebra is shorter and the sternauli hardly reach beyond the centre of the mesosternum.

It was first recorded as British by Bridgman from Norfolk ; and, although much rarer than *P. fumator*, I have met with it in August at Lyndhurst, in the New Forest, and Barnby Broad in Suffolk ; and received it from Tuck from Finborough Park near Stowmarket in late September ; Butler from Abinger Hammer and Capron from Shere, both near Guildford ; Yerbury from Clifford's Castle in Hereford, and Charbonnier has found it at Bristol in May, probably after hibernation. Tomlin has taken it at Matlock in early July ; and it is also recorded from Sweden and Germany.

33. *rotundipennis*, *Thoms.*

Phygadeuon fumator, var., Bridg. Trans. Ent. Soc. 1881, p. 151, ♀ (brachypt.). *P. rotundipennis*, Thoms. O. E. x. 963, ♀.

Black ; antennae usually with the four basal joints and base of the fifth red, sometimes infusate above, or with the first and second or only the second joint rufescent. Abdomen black with the second, and basal half of the third, segment red. Legs red ; all the coxae and trochanters flavidous, or with the hind coxae more or less, and the apices of their femora, infusate. Wings hemipterous. Length, 3-4 mm.

This species is very similar to *P. dimidiatus*, but usually the four basal antennal joints, the second and basal half of the third segment, are red; the wings are abbreviated and apically rounded, hardly reaching to the apex of the first abdominal segment. The metathorax is slightly more rugose than that of *P. fumator*.

The only specimen I have seen of this species agrees exactly with the above very short description. The head is very closely punctate, dull and decidedly broader than the cylindrical thorax, which has the mesonotum dull and closely coriaceous, the scutellar fovea very large, the areola strongly elongate, basally rounded and apically truncate, parallel-sided and emitting the distinct costulae far before its centre; the post-petiole is dull, finely and very closely punctate, with weak carinae and its lateral margin bordered to the narrowly red apex; the red segments are distinctly punctate and the remainder glabrous, the terebra is about half the length of the obovate abdomen; and the wings, with entire venation, are strongly infumate throughout, with the radix and base of the concolorous stigma pure white. The antennae are more slender with the basal flagellar joints much longer and the vertex of the head narrower than in *P. fumator*, which also has the legs stouter and their tarsi shorter.

Bridgman tells us (*loc. cit.*) that he took his semi-apterous *P. fumator* by beating towards the end of August; and it is probably this which he records (*Trans. Norf. Soc.* v. p. 613), from Mousehold near Norwich in August, as *P. rotundipennis* with a query, though the synonymy between his description and that of Thomson appears sufficiently obvious; the former adds that Cameron took three examples in Scotland. Upon my only visit to Mousehold Heath I was so fortunate as to capture a specimen of this interesting species—a form intermediate between the macropterous and brachypterous *Cryptinae*—in its original British locality, in a gravel pit, on 9th June, 1901. Elsewhere it has only been noticed in Sweden.

PANARGYROPS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 182; *Leptocryptus*, Thoms. O. E. v. 521, x. 963.

Face with long grey or white pilosity; eyes large and glabrous, their posterior orbits not situated above the bases of the mandibles; cheeks short; clypeus rarely bidentate. Antennae very slender. Thorax immaculate; notauli extending beyond the centre of the mesonotum; sternum with grey pilosity; areola emitting costulae from before its centre; apophyses wanting. Abdomen nearly always slender, elongate and sub-cylindrical: basal segment elongate, with the spiracles generally central and its membrane short; second segment with spiracles far from the margin and very often aciculate throughout, the third with epipleurae narrow; terebra deflexed and often elongate. Legs, especially the femora, very slender, with claws and calcaria very fine; tibiae not spinulose. Wings somewhat narrow, with the areolet hardly entire externally; the parallel nervure nearly always emitted from the centre of the brachial cell; lower angle of the discoidal cell acute and its fenestra often centrally corneous.

The species of this unusually natural genus are very distinct from those of both *Phygadeuon*, in their much more slender form, elongate and rarely

obovate bodies, and especially in their long and slender legs and antennae, and *Hemiteles*, though perhaps more nearly approaching the latter; in fact they appear to form a very natural and distinct link between the two groups. The coloration of most of the species is similar and different from that of either group in the delicate red of the disc of the abdomen, which gradually merges into the infuscate lateral margins. In the peculiarly long and dense pubescence and the shape of the abdomen (except the basal segment) the males are liable to become intermixed with the Tryphonid genus *Adelognathus*, Holmgr., with which Gravenhorst confused some of this group. Brischke recognized this genus, though he was of the erroneous opinion that it might constitute *Chaeretymma*, Först. For some occult reason British authors have confused it with *Nematopodius*, which is very abundantly distinct, but Brischke did not do so, although their error doubtless arose from his mode of classification which made it appear as though his *Cryptus ater* belonged to that genus at first sight. Great confusion has hitherto existed in this genus, which has been in no way mitigated by Schmiedeknecht, and the records of localities and hosts must consequently be regarded with due caution.

Table of Species.

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|-------|---|-------------------------------|
| (6). | 1. Second segment aciculate; areolet incomplete. | |
| (5). | 2. Central segments nitidulous and subglabrous; prothorax black. | |
| (4). | 3. Scape not paler beneath; central incisures not stramineous | 3. AEREUS, <i>Grav.</i> |
| (3). | 4. Scape white beneath; central incisures stramineous | 6. TENERRIMUS, <i>Grav.</i> |
| (2). | 5. Central segments coriaceous and dull; prothorax red | 2. COLLARIS, <i>Thoms.</i> |
| (1). | 6. Second segment not aciculate; areolet sub-entire. | |
| (12). | 7. Abdomen partly red and distinctly longer than terebra; clypeus entire. | |
| (11). | 8. Hind tibiae not or basally pale. | |
| (10). | 9. Vertex broad; face densely villose throughout | 4. PELLUCIDATOR, <i>Grav.</i> |
| (9). | 10. Vertex transverse; face sparsely villose | 1. TENUIPES, <i>Grav.</i> |
| (8). | 11. Hind tibiae only centrally pale | 5. TENUIS, <i>Grav.</i> |
| (7). | 12. Abdomen black and hardly longer than terebra; clypeus bidentate | 7. CLAVIGER, <i>Tasch.</i> |

1. *tenuipes*, *Grav.*

Phygadeuon tenuipes, Gr. I. E. ii. 720; *Tasch. Zeits. Ges. Nat.* 1865, p. 27, ♂. *Hemiteles ruficaudatus*, Bridg. *Trans. Ent. Soc.* 1883, p. 149, ♀. *Stylocryptus ruficaudatus*, Bridg. *lib. cit.* 1886, p. 339. *Leptocryptus ruficaudatus*, Bridg. *lib. cit.* 1889, p. 415; *Thoms. O. E.* x. 966, ♂ ♀.

Head smooth and shining, densely pubescent, hardly narrower than the thorax; face sparsely pilose; vertex transverse and hardly narrowed behind the eyes; clypeal foveae small and not pilose. Antennae of ♂ entirely black; of ♀ two-thirds the length of the body, black with the

basal flagellar joint red and four times longer than broad, the following becoming gradually shorter, with second partly red, the apical quadrate. Thorax smooth and pubescent; notauli distinct; metathorax short, declived throughout, with distinct areae; areola hardly transverse and apically angulated; petiolar area broad, discreted, reaching beyond the centre with a central longitudinal costa. Scutellum black. Abdomen fusiform, red, ♂ with the central segments sometimes laterally infusate; basal segment elongate, longer than the terebra, black, of ♂ linear, of ♀ gradually explanate throughout and twice broader apically; post-petiole centrally canaliculate; second segment not striolate, infusate and explanate towards its apex and hardly, with the following segments distinctly, transverse; anus sub-infusate. Legs slender, red; ♀ with the apices of the hind tibiae, tarsi and sometimes of their femora, infusate; of ♂ stramineous, with the hind femora except at base, tibiae, tarsi and more or less of their coxae, piceous. Wings with the radix and tegulae pale, stigma piceous; areolet externally sub-incomplete, cubital nervure divergent and nervellus antefurcal. Length, 4-6 mm.

Thomson says *P. ruficaudatus* differs from all the rest of his genus in its rather stouter legs and body, the divergent cubital nervure, apically angulated areola and shorter post-petiole. The ♂ differs from that of the next species in having the hind tibiae unicolorous, the face narrowed towards the mouth, sub-glabrous with hardly any pubescence and the notauli extending only to just beyond the centre of the mesonotum.

[*Phygadeuon tenuipes* is thus described:—Head black with white facial pilosity. Antennae very slender, sub-setaceous, shorter than the body. Thorax immaculate; metanotum rugulose and pubescent, declived throughout; areae complete with areola foveiform, nitidulous and sub-circular; apophyses wanting, spiracles circular. Scutellum gibbulous, black. Abdomen fusiform, narrower than thorax; dark red with the seventh, and first segment except its apex, black; basal segment sub-linear, with post-petiole broader and flatly aciculate, with slight fovea between the tubercles; second pubescent, with obsolete scattered punctures; incisures deeply impressed. Legs very slender, testaceous-red; femora partly or mainly, hind tibiae and tarsi, black; hind femora slender. Wings slightly clouded; radix whitish, tegulae infusate or black. Length, 3 lines.

It is obvious, I think, from the above description, that this ♂ is referable to the present genus; the pilose face, slender antennae and legs and the absence of apophyses, all point to this conclusion. Moreover, no doubt remains in my mind that it is synonymous with *P. ruficaudatus*, Bridg. It has been bred from *Fumea nitidella* (Entom. 1882, p. 276).]

This is certainly a common species on the Continent and not uncommon with us; Dr. Capron took several females at Shere in Surrey, Bridgman at Wroxham and Earlham near Norwich in July, and Rev. T. A. Marshall on one occasion captured both sexes in great numbers. Piffard has found it at Felden in Herts., Beaumont at Blackheath in the middle of June and Tuck at Tostock in Suffolk early in the same month. I have swept it from the flowers of *Spiraea ulmaria* on the banks of the Alde at Farnham in Suffolk, in the middle of July, and in a damp meadow at Sea View in the Isle of Wight in the middle of August.

2. *collaris*, *Thoms.**Leptocryptus collaris*, Thoms. O. E. xxi. 2388, ♀.

Head strongly nitidulous and black, with the centrally impressed, broad and glabrous clypeus red; vertex hardly narrowed behind the eyes; face sparsely pubescent, palpi stramineous. Flagellum brunnescens, with the scape paler beneath. Thorax black, with the prothorax and elongate callosities before the whitish radix red; mesonotum nitidulous and convex, with distinct and discally coalesced notauli; metathorax sparsely pubescent, with complete upper areae, of which the areola is elongate and apically acuminate; petiolar area not discreted, apophyses minute. Scutellum convex and black. Abdomen elongate-ovate, ferrugineous with the first and base of segments two to four piceous, remainder black; basal segment linear and scabrous-striolate with distinct tubercles, the three following deeply incised and, except apically, coriaceous with the second aciculate; terebra as long as the petiole and strongly reflexed. Legs pale and slender; the anterior testaceous, basally paler; hind ones red with the trochanters, tarsi and base of tibiae hardly darker. Wings normal with the areolet sub-entire, nervellus opposite and not intercepted. Length, $4\frac{1}{2}$ mm.

There can be no doubt that a female taken by Bignell at Plym bridge on 7th August, 1884, and labelled "Genus query," is referable to this species, which has not before been noticed outside Sweden; I am also of opinion that Dr. Capron took a single female at Shere in Surrey. It is strange, however, that Thomson makes no mention of the peculiarly distinctive sculpture of the abdomen; and at first I had thought it the unknown ♀ of *P. tenerripus*, on account of its aciculate second segment. It may still be so, for Thomson's ♀ bears many features in common with that species.

3. *aereus*, *Grav.*

Cryptus pellucidator, Gr. I. E. ii. 581, excl. ♀; Ste. Ill. M. vii. 291, ♂ (*nec* Thoms.). *C. aereus*, Gr. I. E. ii. 578, excll. ♂ *et* varr. 2-4; Ste. Ill. M. vii. 290 (part). *Phygadeuon aereus*, Tasch. Ges. Nat. 1865, p. 28, ♂ ♀. *Leptocryptus aereus*, Thoms. O. E. x. 965, ♂ ♀.

Head black, slightly constricted behind the base of the ferrugineous mandibles, palpi pale; clypeus very small, sub-discreted, its foveae with dense flavidous, and frons with grey, pilosity; cheeks very short and densely pubescent; epistoma laterally sulcate. Antennae slender, filiform; basally rufescent with the scape always paler. Thorax immaculate and pubescent; metathorax of ♀ rugose with distinct costae, its areola large and regularly hexagonal, petiolar area oblique and discreted, apophyses wanting, spiracles circular and indistinct. Scutellum black. Abdomen strongly pubescent, of ♀ elongate-ovate, of ♂ apically sub-clavate; black with the central segments more or less discally, and sometimes the anus entirely, castaneous; terebra shorter than the deplanate, black, very long and gradually explanate basal segment; post-petiole elongate, finely aciculate and centrally deeply canaliculate; second and third segments very finely aciculate and centrally smooth at the apex. Legs slender, pale red;

hind ones sometimes with the femora and tibiae externally and the tarsi, or at least the apices of the tibiae, infusate. Wings hyaline, radix and tegulae stramineous; areolet externally incomplete; nervellus opposite and not intercepted. Length, 4-5½ mm.

This species may be known from its allies having the abdomen centrally striolate, by its incomplete areolet, sub-constricted head, and by its shorter terebra and shorter abdominal segments. *Cryptus pellucidator*, as known nowadays, consists of the female doubtfully referred to it by Gravenhorst, and placed in the present genus by Thomson, and the male afterwards described by the latter, since Gravenhorst's typical ♂ is considered that of the earlier-described *C. aereus*; the former has the central segments obsoletely punctate, not striolate, and does not appear to have been previously satisfactorily mentioned from Britain.

Rare, taken near Andover by the Rev. G. T. Rudd; near London in June (Stephens), common in Norfolk (Bridgman), Bickleigh in Devon, early in June (Bignell). There are several females in Dr. Capron's collection from Shere in Surrey, and I have taken it at Ryde in the Isle of Wight, a ♂, early in August. It occurs throughout northern and central Europe and is, according to Brischke, always hyperparasitic—upon *Aporia crataegi*, *Pieris brassicae*, and through a species of *Microgaster* upon *Botys verticalis*; it may, however, have been directly parasitic upon *Eupithecia centaureata* (cf. Schr. Ges. Nat. Danz. 1882, p. 338).

4. *pellucidator*, Grav.

Cryptus pellucidator, Gr. I. E. ii. 583, ♀. *Leptocryptus pellucidator*, Thoms. O. E. x. 965, ♀; xxi. 2388, ♂.

This species so exactly resembles *P. aereus* that the synonymy has become much involved, and the two kinds so confused in British collections as to render it doubtful if the present species has ever been definitely recorded from Britain; this state of things is probably largely due to Marshall's lack of discrimination in his catalogues.

The distinction, however, when once indicated, is very apparent. The second segment of *P. pellucidator* in both sexes is obviously and evenly punctate, whereas in *P. aereus* it is distinctly aciculate; besides this the former has the terebra longer than half the abdomen with the two anal segments (always pale in *P. aereus*) distinctly infusate. Than *P. tenuipes* the female is much more slender with longer terebra, and both sexes are more distinctly pubescent throughout.

This species is much the commonest of the genus in Britain, though only recorded from Sweden and Germany on the Continent, where it does not appear to be sufficiently understood, and probably most of our records under *P. aereus* refer to it. I possess it from Shere (Capron), Cornworthy (Marshall), Exeter at the end of September (Bignell), Felden in Herts. (Piffard), Abinger Hammer in Surrey, in August (Butler), Tostock in Suffolk, early in September (Tuck); and I have found it at Lakenheath and Assington in June, and at Covehithe in October, by general sweeping (all in Suffolk). Evans has taken it at Polton, near Edinburgh, in June.

5. *tenuis*, Grav.

Cryptus tenuis, Gr. I. E. ii. 544, ♂; Tasch. Zeits. Ges. Nat. 1865, p. 89, ♂ ♀; Brisch. Schr. Nat. Ges. Danz. 1882, p. 337, ♀. *Hemiteles fragilis*, Gr. I. E. ii. 828; Tasch. Zeits. Ges. Nat. 1865, p. 133, ♀; Bridg. Trans. Ent. Soc. 1889, p. 416, ♂. *H. formosus*, Desv. lib. cit. ser. II. v. 211, ♂ ♀.

Head black with the face densely pubescent and not narrowed towards the mouth; palpi pale stramineous, mandibles centrally castaneous; clypeus not discreted, apically truncate. Antennae slender, longer than half the body, filiform, infusate and basally rufescent beneath; flagellar joints cylindrical throughout; ♂ with the basal joints stramineous, and the remainder testaceous, beneath. Thorax immaculate; notauli of ♂ deeply impressed and extending almost to the scutellar fovea; metathorax elongate with recumbent pubescence and incomplete areae; areola ill-defined, hexagonal; petiolar area discreted, strongly oblique and not separated from the metanotum; spiracles circular. Scutellum black. Abdomen oblong-ovate, as broad as the thorax, black; basal segment sub-linear with the post-petiole gradually dilated towards the pale apex, sub-glabrous, nearly parallel-sided and centrally sub-canaliculate, broader in ♀; second segment shining, obsoletely punctate, red and basally black; third red with lateral black marks and isolated punctures; fourth black and discally castaneous; terebra nearly as long as the abdomen. Legs slender, red; the anterior pale fulvous with the coxae and trochanters paler, sometimes whitish; hind ones testaceous, with the tarsi, apices of femora and base and apex of tibiae infusate; ♂ with the centre of the hind tibiae distinctly red. Wings somewhat large; stigma piceous, radix and tegulae white; areolet externally sub-incomplete. Length, 6–7 mm.

Desvignes' species appears to be certainly synonymous with those of Gravenhorst, as indicated by Bridg.-Fitch; its terebra, however, is said to be hardly so long as half the abdomen, and neither Gravenhorst nor Taschenberg noted the apically pale post-petiole, which is often immaculate; the terebra is, actually, about two-thirds the length of the abdomen. It is figured in Blackwall's "History of Spiders," pl. xii. fig. BB, and I have examined Desvignes' types in the British Museum.

Fred. Smith tells us (Trans. Ent. Soc., ser. II. v. p. 209) that he bred both sexes somewhat freely, together with *Pezomachus fasciatus*, Fab., with which it appears to have no connection, from the snow-white, mud-coated nests of the common field spider, *Agroeca (Agelena) brunnea*, Bl.; never more than a single parasite was raised from each nest, which would appear to supply more than its needs since, in every instance, four or five spiders also emerged from the same nest; he found the larvae still living in the nests in July.¹ I possess two ♂ ♂ and three ♀ ♀ bred together, possibly from a *Tenthredinid* larva, by Miss Chawner at Lyndhurst in the New Forest.

This species is said to occur in May, and to be generally distributed in Norfolk in June and July, where also it has been bred from spiders' nests. Bignell bred it in Devon from the egg-bag of *Agelena brunnea* in mid-August; and Marquand has taken it in the Land's End district. Bridg.-

¹ "Notes on the Economy of the Ichneumons constituting the Genus *Pezomachus* of Gravenhorst, and Observations on *Pezomachus fasciatus*, by Frederick Smith, Esq.; with a Description of a New Species of *Hemiteles*, by Thomas Desvignes, Esq." Read July 4th, 1859.

Fitch think Wilson's record of this species' parasitism upon *Emphytus cinctus* an error; and it is recorded from Essex by Harwood. Bridgman, *in lit.* to Fitch, says he bred it at Norwich in May, 1881, from the previous year's nests of "*Agelia brunnicornis*"; it has been found not rarely by Charbonnier at Freshford near Bath in May, Capron at Shere, Feldein in Herts. by Piffard, and Newbery has swept it at Ivybridge in Devon, in August, 1905. Elsewhere it has only been noticed in Germany, where Brischke bred *H. fragilis* from both a spider's nest and hyperparasitically from a cocoon belonging to the Ophionid genus *Limneria*. I have recently examined a male bred by Rev. O. Pickard-Cambridge from another species of spider, *Agroeca proxima*, Cambr., in Dorsetshire; Beaumont has taken it at Exeter in July.

6. *tenerrimus*, Grav.

Hemiteles tenerrimus, Gr. I. E. ii. 831; Tasch. Zeits. Ges. Nat. 1865, p. 135; Schm. Term. Füz. 1897, p. 542, ♂.

Antennae slender, filiform, nearly the length of the body, with the scape white beneath. Metathoracic areae feeble but complete; petiolar area oblique and discreted; apophyses wanting. Abdomen fusiform, sub-petiolate, a little narrower than the thorax; black, with segments two and three and the base of the fourth piceous, the two former with the incisures stramineous; basal segment aciculate and gradually dilated apically, twice longer than broad with sub-obsolete tubercles; post-petiole parallel-sided and the following segments less strongly aciculate. Legs normal, the anterior stramineous, with the trochanters and apices of the coxae white, coxae basally and femora externally in the centre infusate; hind legs infusate, with the coxae black, apices of the trochanters and base of tibiae stramineous. Wings hyaline, with the stigma dull stramineous, radix and tegulae whitish. Length, 3 mm.

The slender antennae, absence of apophyses, parallel post-petiole and aciculate basal segments ally this ♂ with *Panargyrops* (among which it is comparable with *P. claviger*, Tasch.), though its true position can hardly be ascertained in the absence of the female.

This species has been captured at Dousland in Devon, late in the autumn, by Bignell; and bred, according to Bridg.-Fitch, by Parfitt from *Microgaster* cocoons in the same county. It has also been bred by Goureau from "nids pédonculés d'Araignées" (? *Agelena brunnea*); and it is, consequently, strange that Schmiedeknecht, who retains this species in the genus *Hemiteles*, quotes only Gravenhorst's original record of it from Silesia, in 1905.

7. *claviger*, Tasch.

Cryptus claviger, Tasch. Zeits. Ges. Nat. 1865, p. 76, ♂. *Leptocryptus claviger*, Thoms. O. E. x. 964, ♂ ♀. *Cryptus ater*, Brisch. Schr. Nat. Ges. Danz. 1882, p. 337, ♂ ♀. *Nematopodius ater*, Bridg.-Fitch, Entom. 1883, p. 38, ♂ ♀.

A shining, black species with grey pubescence. Head not narrowed behind the eyes, cheeks broad and face pubescent; clypeus flat and apically bidentate in the centre; palpi and mandibles, except the apices of the latter, flavous. Scape of ♂ flavous beneath. Metathorax gradually

declined throughout, apically produced above the hind coxae, with complete upper areae of which the areola is hexagonal, entire and elongate; petiolar area discreted. Abdomen strongly elongate-fusiform and black, with the incisures of the three basal segments very narrowly red and of the remainder narrowly white; basal segment linear, finely aciculate, centrally sub-caliculate with prominent spiracles; the second segment twice longer than broad; anus of ♀ compressed, with the terebra hardly shorter than the abdomen. Legs fulvous, of ♂ with the anterior pairs stramineous; hind tibiae and tarsi infusate. Wings normal with the radix and tegulae flavous; areolet sub-pentagonal; stigma piceous, nervelet indicated; internal cubital nervure parallel with the basal; nervellus intercepted below the centre. Length, $6\frac{1}{2}$ –8 mm.

This species has been hitherto known in Britain as "*Nematopodius*" *ater* (I cannot tell why, for Brischke did not name it so), though *Leptocryptus claviger* figures in MS. in Marshall's own copy of his 1872 Catalogue, which I possess. It may at once be distinguished from all the other species of this genus by its black and narrower body, apically bidentate clypeus and the very long terebra. Even in 1883 it was hardly referable to *Nematopodius*, which has the metathorax glabrous and unicostate, with the areolet small and quadrate! The villose head, sternum and metathorax, elongate basal segment, deflexed terebra and slender legs place it with certainty in the present genus, among whose species its areolet exactly resembles that of *P. tenuipes*.

Capron first took this species in Britain and I have a long series of both sexes in his collection; males were subsequently found commonly close to Norwich towards the end of May by Bridgman (Trans. Ent. Soc. 1882, p. 145), and Marquand records it from the district of Land's End. Brischke bred it from the cocoons of *Lophyrus pini* in Germany, whence its range extends to Lapland; and T. Wilson of York in some numbers from *Emphytus cinctus* in Britain.

ORESBIUS, *Marshall*.

Marsh. E.M.M. iii. (1867), p. 193.

Antennae stout and twice longer than head and thorax. Metathorax incompletely areated, rugose and punctulate; petiolar area indicated by slight lateral carinae. Scutellum conspicuous. Body deplanate throughout "et sub saxis degenti idoneum." Abdomen much longer than head and thorax, dorsally deplanate; basal segment punctulate and not aciculate, triangular, basally very broad and gradually narrowed to apex, with no tubercles; terebra as long as the first segment. Legs with tarsal joints not bilobed. Wings reaching slightly beyond base of metathorax; radial cell short and ovate, two cubital cells present, areolet wanting, all the nervures stout and pilose.

1. *castaneus*, *Marsh*.

Oresbius castaneus, Marsh. E.M.M. iii. p. 194, ♀ (fig).

Castaneous or red-brown, with griseous pubescence throughout. Head anteriorly black. Antennae red-brown, with twenty-five joints, of which the third and fourth are equal in length; ultimate joint apically infusate.

Metathorax black. Legs with the coxae and trochanters red-brown. Length, 5-8 mm.

This species is said to differ from *Aptesis* only in the unicolorous antennae.

Two specimens of the above variable size were taken by Marshall beneath stones at the top of Garbhavel, near Loch Rannoch, in July, 1866. The author adds: "The species may be suspected of being a parasite of *Nebria*, *Patrobis* or *Otiorhynchus maurus*. These are about the only insects occurring at that elevation (some 3,500 feet) capable of maintaining such a creature. No spider of sufficient size was to be found." Dr. Sharp (E. M. M. iv. p. 18) adds that he captured an example of this species some years before on Goatfell, in the Isle of Arran.

HEMITELINI.

This tribe is to be distinguished from the preceding specifically by the externally incomplete areolet and collectively by the slender legs and antennae. There is, however, a great similarity in its species with those of *Panargyrops* and the smaller *Phygadeuones*, and it is only by their general facies that distinction is possible. *Hemiteles* and its immediate genera resemble, usually excepting their areolet, both *Cryptus* and *Phygadeuon* (*sensu lato*) in miniature: not all the species have longitudinal metathoracic costae, in fact the majority of *Pezomachi* of both sexes bear no trace of areolation upon the propodeum. The lack of a definite line of demarcation is to be much deplored; but, of the whole *Ichneumonidae*, no group is more difficult of discrimination generically than the present, though undoubtedly very highly specialized as a whole to perform the indispensable duties assigned to it by Nature, nor has any at present attained less distinct evolution *inter se* throughout the whole Insecta, excluding certain sections of the *Chalcididae*.

HEMITELOIDES.

This group remains very much in the condition it had assumed when Marshall's last catalogue was published thirty years ago; many species have been added to the British fauna since that time, but it is still what it was then designated (*cf.* Ent. Ann. 1874, p. 123), "a receptacle for all the species, however otherwise dissimilar, which have an imperfect areolet." None of the much-too-elaborate seventy-two genera into which it was distributed by Förster in 1868 have been adopted by the most recent Continental authors, though they have been tabulated (for what they may be worth) by Ashmead in 1900; and it is with some hesitation that I here introduce two of them as sufficiently distinctive. An unknown male example of Förster's sub-genus *Aschistus* was bred from *Coleophora aespitiellia* found at King's Lynn and Mousehold near Norwich by Bridgman, who says (Trans. Norf. Soc. 1893, p. 617) that it is evidently the male of some species of *Pezomachini*. Probably several more species at present standing under *Hemiteles* will have to be transposed to *Cecidonomus*, when that still somewhat ill-defined genus is more fully known.

The *Pezomachoides* may be distinguished from the present group with

sufficient facility by the entirely apterous condition of the females, and in the males by the very much less strongly curved basal nervure of the wings, which also usually have the stigma broader.

Table of Genera.

(2). 1. Petiolar spiracles before centre ; areolet wanting	ORTHOPELMA, <i>Tasch.</i>
(1). 2. Petiolar spiracles beyond centre ; areolet internally complete.	
(6). 3. First segment distinctly contracted basally, usually slender and narrow.	SPINOLIA, <i>Först.</i>
(5). 4. Areolet internally irregular ; scutellum bordered	
(4). 5. Areolet internally regular ; scutellum not bordered	HEMITELES, <i>Grav.</i>
(3). 6. First segment only slightly contracted basally, stout and broad.	OTACUSTES, <i>Först.</i>
(8). 7. Head transverse ; metathoracic spiracles large and oval	
(7). 8. Head cubical ; metathoracic spiracles small and circular.....	CECIDONOMUS, <i>Bridg.</i>

ORTHOPELMA, *Taschenberg.*

Tasch. Zeits. Ges. Nat. 1865, p. 137.

Head short, with vertex narrow, cheeks short, with genal costa inflexed ; mandibles slender and peristomium small ; clypeus compressed, discreted and apically sub-emarginate ; labrum conspicuous. Antennae short and filiform with scape not excised. Pronotal epomia distinct ; mesonotum sub-gibbose, with notauli wanting ; metanotal areae complete and sharply defined with only the basal area wanting ; spiracles small, circular and placed near the base in the spiracular areae ; mesosternal sulci entire and somewhat curved. Abdomen oblong-fusiform, convex, with basal segment linear, nearly cylindrical, not contracted basally, centrally canaliculate throughout, flat beneath with the membrane very short, and the spiracles before the centre ; ventral valvulae not vomeriform, terebra straight and slender. Legs somewhat stout, with the hind ones not elongate. Wings with stigma somewhat broad and triangular, the discoidal cell with its lower angle strongly acute and much longer than the brachial, which has its lower angle rectangular ; areolet usually not indicated ; nervellus slightly antefurcal and not intercepted ; second recurrent strongly sinuate.

Thomson places this genus among the *Pimplinae*, saying that it differs from the *Cryptinae* in its areolet, the not pentagonal areola, shorter antennae, undeveloped supra-coxal areae, in having the petiolar spiracles before the centre and its membrane extremely short, but (with the single exception of the petiolar conformation) it is certainly better placed in the present group than in the *Pimplinae* and the antennae are certainly longer than those of the *Stilpnini*, in the typical species.

The species are probably exclusively parasitic upon gall-making *Cynipidae*.

Brischke gives *Tanytelma*, *Först.*, as synonymous with this genus, but I can find no description of such a genus.

Table of Species.

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| (2). 1. Antennae of normal length ; areola centrally explanate | 1. LUTEOLATOR, Grav. |
| (1). 2. Antennae very short ; areola parallel-sided | 2. BREVICORNIS, Morl. |

Fig. 1.



Fig. 1 A.



Fig. 2.

*1. luteolator, Grav.*

Hemiteles luteolator, Grav. I. E. ii. 826 ; Ratz. Ichn. d. Forst. ii. 130, ♂ ♀. *Orthopelma luteolator*, Tasch. Zeits. Ges. Nat. 1865, p. 137 ; Thoms. O. E. viii, 735, ♂ ♀.

A small black species with stout legs, and abdomen more or less red. Head transverse, not broader than eyes and somewhat rounded posteriorly ; vertex and face shining, sparsely punctate with long villosity, the latter somewhat deplanate though intumescent beneath antennae ; cheeks broad and buccate, clypeus small and testaceous ; mandibles narrow and, like the palpi, flavidous. Antennae black, filiform and pubescent, of ♂ slightly attenuate apically ; flagellum consisting of about eighteen joints and extending beyond apex of metathorax ; with basal joint only slightly longer than second and twice longer than broad. Thorax strongly convex with griseous pubescence ; mesonotum very finely and closely punctate with no notauli, the mesopleural sulci strong ; metathorax somewhat shining with complete areae, of which the areola is sub pentagonal, centrally explanate, confluent with the basal area, and apically truncate ; petiolar area discreted and of normal length, apophyses wanting. Scutellum black, sparsely punctate and hardly convex. Abdomen of ♂ sub-cylindrical, of ♀ slightly rounded centrally ; red, with the first segment always, usually apices of the apical ones and sometimes of all the segments, black or infusate ; basal segment not contracted basally, parallel sided, sparsely punctate and pubescent, centrally canaliculate throughout, with the prominent spiracles placed far before its centre ; following segments somewhat strongly nitidulous, though with fine flavidous pubescence ; terebra one-third of the abdomen and longer than basal segment. Legs dull testaceous ; coxae black, with front ones infusate, apices of trochanters flavous, hind femora piceous ; intermediate tibiae curved and hind ones incrassate before the often white base. Wings hyaline ; stigma broad and piceous, radix and tegulae bright flavous ; areolet not indicated ; its recurrent nervure strongly sinuate, with fenestrae very widely separated ; nervellus opposite and not intercepted. Length, 3-5 mm.

The larva (see figure 1) and pupa of this species are, I believe, figured by Ratzeburg in the Act. Ac. L.C. xvi. pl. 9, fig. 11 ; but this I have not seen. Larvae I have noticed, however, are entirely yellowish white, apodous and adipose with no dorsal prolegs at all, the spiracles are

castaneous and minute, as also are the mandibles. These are the only markings with the exception of the sub-infusate rudimentary labium below and between the latter. The frontal marks representing antennae, indicated in figure 1A, are hardly darker than the ground colour, though slightly elevated. Progression is effected by the elongate apical segment. When touched the movement of the body is vertical and not lateral; it is, however, very sluggish. Length (in position figured), 3 mm.

The pupa (see figure 2) is of the same colour as the larva, though much less fleshy, the abdominal segments being less rounded; and at least the antennae and tibiae are in distinct sheaths. The only markings are the eyes and the ocelli, which are pale castaneous, the mandibles being of the same ground colour. The insect is still capable of the vertical movement noted in the larva. Of course when the time of maturity approaches the dark coloration gradually spreads till it is universal. Length (in position figured), 3 mm.

This species is a very common parasite in the bedeguar rose galls, preying upon the larvae of the maker, *Rhodites rosae*, whence Bridg.-Fitch say they emerge during the second year, but I have often bred them in the first. Thus in January, 1900, I gathered a gall of this Cynipid, from which males of *luteolator* began to emerge on May the 11th following, and continued to do so, together with the host, until June 8th; in all thirty-six specimens, only two of which were females, emerged. At another time eleven males and two females emerged from the same kind of gall between the 18th and end of June. The galls are, however, by no means always infested with the parasite, for examples gathered at Ryde contained none and at Wrentham in Suffolk one produced forty makers but no parasites. It is common in Suffolk, in Norfolk, about Hastings, Maldon in Essex and Shere in Surrey; Bedwell has taken it at Boxhill, Charbonnier at Bristol, Dalglish a long series at Gifnoch; and I have found it on my study window in Ipswich, where were galls of *Cynips Kollari*, though none of *Rhodites*. Bignell has bred it in Devonshire from the gall of *Aulax hieracii* on *Hieracium umbellatum* (Entom. 1885, p. 152); it has been bred from *Rhodites eglanteriae* and *R. rosarum*; Tischbein bred it from oak galls and Taschenberg from the infected thistle heads of *Carlina vulgaris*. Laboulbène, probably incorrectly, gives it as parasitic upon *Vanessa urticae*. No relationship is yet suggested between this species and the Ophionid, *Porizon harpurus*, Schr., which is frequently bred from the same kind of galls.

2. *brevicornis*, sp. n.

A small, pubescent, black species, with red tibiae, anterior femora and, for the most part, abdomen; and with antennae and terebra very short. ♀. Length, $4\frac{1}{2}$ mm.

This species so closely shares all the features of *O. luteolator* as to demand no particular description. Therefrom, however, it is abundantly distinct in its black mandibles which are strongly protuberant; the antennae are incrassate, apically obtuse and do not reach the apex of the metathorax, with only thirteen flagellar joints; the areola is parallel-sided and sub-confluent with the very short petiolar area; terebra very short and about two-thirds the length of the basal segment.

I have seen two females of this insect ; one was captured at Shere in Surrey by Dr. Capron, and the type I took by sweeping in Wicken Fen, Cambs., in the morning of 8th June, 1902.

SPINOLIA, Förster.

Först. Verh. pr. Rheinl. 1868, p. 173.

Head strongly transverse, with the vertex exactly level with the summit of the eyes, from which the ocelli are not far distant. Antennae very slender, with more than twenty joints, of which the second flagellar is not longer than the first ; cubital transverse nervure of the upper wings wanting. Metanotum areolated ; its spiracles small and circular. Scutellum bordered throughout. Basal segment distinctly petiolate ; the third alone transversely impressed. Legs slender. Wings of ♀ very strongly fasciated ; both sexes with the areolet entirely wanting externally and nearly obsolete internally.

The facies of this genus, together with its profuse rufescent coloration and the female fasciated wings, render it doubtful whether *Hemiteles areator*, *bicolorinus*, *longicauda* and, perhaps, *cingulator* should not also be included here, though differing more or less widely from certain of the generic characters ; *H. bicolorinus* may be distinguished from all other members of that genus by the irregular inner nervure of the areolet, being transitional between *Hemiteles* and the present genus, which has not before been employed by systematists. I am certainly of opinion that Förster's genus *Catalytus* (1850) should be placed here ; the alar development, which abundantly distinguishes our two species, being the most pronounced distinction.

1. *maculipennis*, Grav.

Hemiteles maculipennis, Gr. I. E. ii. 852 ; Tasch. Zeits. Ges. Nat. 1865, p. 137 ; Thoms. O. E. x. 998, ♀ ; *lib. cit.* xxi. 2388, ♂ ; Schm. Term. Füz. 1897, p. 502, ♂ ♀.

♀. A rufo-testaceous insect with boldly fasciated wings. Head black, triangular, with prominent eyes ; vertex narrow and declived ; clypeus discreted and apically produced ; epistoma prominent ; mandibles with acute teeth, of which the upper is nearly the longer. Antennae filiform, nearly as long as the body, with twenty-seven flagellar joints, of which the basal are apically nodulose ; black with the three central, and rarely the three basal flagellar joints blood-red. Thorax substriate-rugose, with white pilosity, sometimes entirely black but usually rosy with the pronotum, breast, scutellar region and more or less of the metathorax, black ; notauli reaching centre of the deplanate mesonotum, mesopleuræ rugose but glabrous above ; metathorax reticulate with the areæ complete and well-defined, areola narrow-hexagonal, petiolar area large but not discreted. Scutellum often red ; laterally margined throughout. Abdomen ovate, as broad as the thorax ; black, with the first segment except sometimes the dorsal dots, second and basal angles of the third, or only the apices of the first and second, rosy ; sixth and seventh apically whitish ; basal segment stout, curved, longer than broad and gradually dilated apically, densely striolate with neither carinae nor tubercles ; third segment transversely

impressed centrally; terebra somewhat longer than the first segment. Legs slender, black, with all the tibiae and femora more or less ferrugineous; tarsi infusate, front ones paler. Wings normal with two broad, determinate fasciae and a large apical spot piceous; stigma and tegulae black, radix and base of stigma whitish; areolet wanting; fenestrae very distinct and widely separated; apical external angle of discoidal cell rectangular; nervellus sub-opposite and intercepted below the centre. Length, 5-7 mm.

♂. Head entirely black with white pilosity; the conformation as in the ♀, but sculpture rather finer and more nitidulous. Antennae as long as the body, slightly attenuate apically and pilose; flagellar joints much shorter than in ♀ and twenty-five in number; black with the pedicellus alone red. Thorax pilose and dull; metanotum trans-striate as in ♀; metathorax nitidulous and sub-glabrous, areae as in ♀ with the petiolar sub-scabriculous and not discreted. Scutellum bordered throughout, basally trans-strigose. Abdomen sub-linear, glabrous and strongly nitidulous throughout, becoming distinctly pilose apically; black with only the incisures of the third segment obsoletely rufescent; basal segment sub-linear and hardly explanate apically, glabrous and nitidulous with no tubercles and only obsolete lateral aciculation. Legs very slender, piceous with the tibiae and apices of the femora testaceous; hind tibiae curved and apically infusate. Wings quite transparent with stigma and tegulae black, extreme base of the former and the radix white; fenestrae distinct and not widely separated; areolet, discoidal cell and nervellus as in the ♀; all the nervures apically pellucid and rarely reaching the apex of the wing. Length, 5 mm.

The femora and tibiae are sometimes nearly entirely testaceous and the external cubital nervure entirely wanting.

[Var. ♂. Head sculptured and conformed as in the type, but sub-rugose with the occipital and facial orbits somewhat broadly testaceous. Antennae stouter, filiform, entirely black and pilose, with twenty-nine flagellar joints. Thorax pilose and dull; mesonotum closely and irregularly punctate, convex with very obsolete notauli; metathorax dull and scabriculous throughout, but with areae as in the type, except the discreted petiolar. Scutellum bordered throughout and basally trans-strigose. Abdomen sub-linear, basally dull but becoming nitidulous, as in type, and pilose apically; black throughout; basal segment sub-linear, centrally explanate with very distinct tubercles, thence parallel-sided; post-petiole and whole of the second segment distinctly aciculate; anus compressed. Legs as in type form, but with the posterior tibiae infusate. Wings distinctly and evenly infumate throughout; coloration of parts as in type form, but with base of the much broader stigma not pale; fenestrae coalesced; discoidal cell apically sub-obtuse; areolet wanting, its inner nervure vertical and not oblique as in type ♂ ♀; basal nervure, unlike the type, broken at the median nervure and much less curved above; nervellus straight and not intercepted. Length, $5\frac{1}{2}$ mm.]

This species differs from all the *Hemiteles* described by Thomson, except *H. (Catalytus) fulveolatus*, in having the inner nervure of the areolet so oblique as to be practically wanting. Schmiedeknecht failed to satisfactorily discriminate between *H. insignis*, Grav., and the present species, and considered Förster's genus of little stability; but Marshall was

not content to allow the present species to remain in *Hemiteles*, and in this view I fully concur. Both sexes appear closely related with the American *Hemiteles thyridopterygis*, Riley.

Mr. Alfred Beaumont records a single British specimen of this species, under the name *Chirotica maculipennis* (E. M. M. 1894, p. 40; now in coll. Chitty), which he captured at Chobham on the 29th July, 1893 (this genus, however, has the thorax exareolated and the areolet sub-pentagonal). He says Marshall has taken it in southern France; it occurs throughout Europe and north Africa, but is not recorded as bred. In June, 1899, Chapman gave me two females of this species bred respectively from Continental *Coleophora conspicuella* and *Psyche tenella*, var. *zermattensis*. Early the following May he sent two females, which had been bred together with two males of my variety, from Locarno, and the next month seven females and two typical males from the same locality, all bred from *P. zermattensis*; later, I received a typical male and female bred, together with a female *Hemiteles areator*, Panz., from *Psychids* also from Locarno. That the above-described male variety is anything more than a hyperparasitic mimic I am by no means convinced; the capital, thoracic and pedal structure is nearly identical with that of the type, but the apically compressed and basally aciculate abdomen, and the conformation of the wings is much like that of certain Ophionids; the emergence of an anally compressed female would, of course, have settled the question.

2. *fulveolatus*, Grav.

Pezomachus fulveolatus, Gr. I. E. ii. 871, ♀. *Catalytus fulveolatus*, Först. Wieg. Arch. 1851, p. 63, ♂ ♀. *Hemiteles fulveolatus*, Thoms. O. E. x. 999. Var. *Pezomachus Mangeri*, Gr. I. E. ii. 872; *Catalytus Mangeri*, Först. Wieg. Arch. 1851, p. 65, ♀. *Aptesis Foersteri*, Bridg. Trans. Ent. Soc. 1882, p. 146, ♀; cf. *lib. cit.* 1883, p. 161. (?) *Catalytus longipennis*, Först. Wieg. Arch. 1851, p. 64.

♂ ♀. Head black, finely alutaceous, normally pubescent and obsoletely punctate; mandibles and clypeus fulvous, with the latter apically piceous and the palpi flavous; epistoma prominent, especially above. Antennae slender and shortly, in ♂ erectly, pubescent, becoming infusate apically, with all the joints longer than broad; basal flagellar joint longer than the second, the fifth longer than broad. Thorax with lateral costae but neither areae nor apophyses; black, with the pro- and meso-thorax red; latter longer than the metathorax and less strongly shagreened; transverse costa wanting centrally, though traceable at the sides. Scutellum distinct and red. Abdomen normally pubescent and obsoletely punctate, black, with segments two to four and apex of the first red; basal segment sculptured as metathorax and more strongly than the remainder, basally narrow with distinct spiracles beyond the centre and thence sub-explanate to the apex; fifth to seventh apically narrowly red; terebra about as long as the basal segment, with the sheaths apically piceous. Legs red; hind femora apically, and the last tarsal joint, infusate. Wings of ♀ reaching nearly to apex of thorax, of ♂ slightly longer, darkish brown though lighter in ♂, with white fasciae extending from the first cubital to the hind margin; venuration complete; stigma entire and basally white. Length, 2-4 mm.

The form *longipennis* appears to differ only in having a dot between the first and second cubital nervures, where is the fascia in *fulveolatus*. *Cat.*

Mangeri differs only in having the wings rather longer and extending to the apex of the basal segment with no stigma, the metathoracic transverse costa entire, petiolar spiracles obsolete and the alar band less determinate.

This species is perhaps somewhat incongruous in the present genus, though evidently closely related thereto by its fasciated wings, rufescent markings and obsolete areolet; in any case *Catalytus* was not a good genus and must fall.

This is by no means an uncommon insect during the first half of June, and I have always taken it by sweeping reeds by the side of rivers at Brandon and Barton Mills, and on one occasion at Barnby Broad in the middle of August, except once when I found it running on the mud at their roots among *Steni* and *Trogophloeï*. Bridgman took a single pair of this species in Norfolk at Brundall and Horning Ferry; these were referable to the variety *Mangeri*, but this form and the type have occurred to me in about equal numbers at the same time and place, and the alar development appears extremely unstable in this species. It has also occurred to me in reed refuse at Oulton Broad at the end of July; Capron once found it in Surrey; and there are many examples in Chitty's collection. The male appears to be much the rarer sex; the only one I possess was taken by Beaumont at Harting in Sussex, in the middle of September.

HEMITELES, *Gravenhorst*.

Gr. I. E. ii. (1829), 781.

Head transverse and not globose; metathoracic spiracles small and circular; areolet internally entire and regular, externally wanting or obsolete; metathoracic costae distinct and usually complete. Antennae and legs slender. Scutellum margined only at the base. Basal segment distinctly petiolate.

A bare mention of *Hemiteles* as British is made by Stephens in his Illustrations, but no species are instanced as definitely British; and Desvignes in 1856 brings forward only fourteen of the known fifty-seven Gravenhorstian kinds as indigenous, together with *H. papilionis*, Curt., of which I know nothing at all; of these *H. palpator* is now referred to *Pezomachus* and needs confirmation, *H. vicinus* is synonymized with *H. melanarius*, and *H. modestus* is considered to be a variety of *H. aestivalis*. In 1870 Marshall raised the total of our species to forty-seven, but in 1872 it falls, through synonymy, etc., to forty-four, which have been the basis of all subsequent British research, a study of which enabled me, in a paper before the Entomological Society in 1901, to add thirty species. Of these *H. breviventris* and *H. maculipennis* are now for the first time transferred to separate genera, *H. furcatus* considered synonymous with *H. laevigatus*, Ratz., *H. tenebricosus* omitted as constituting the ♂ of *Atractodes vestalis*; *H. tenerrimus* and *H. fragilis* (*formosus*, Desv.), included in *Panargyrops*; and *H. inimicus* placed in *Cecidonomus*. Consequently only thirty-eight of the later-catalogue species stand here nowadays. This number I have been enabled to augment from various and sometimes obscure sources—mainly owing to the new descriptions of Thomson and Bridgman—to a total of sixty-six true macropterous *Hemiteles* (a few of which, however, possess dimorphic forms), though even here subsequent observation will

probably reveal more than one to be referable to the genus *Pezomachus*, and I anticipate that many will prove to be synonymous when due attention is devoted to the breeding of these insects, since the range of specific variation is at present most inadequately recognized.

Progress is, however, very marked in the association of the sexes; in 1874 twenty-nine of the forty-four kinds then enumerated were known in one sex only, whereas we are now ignorant of the opposite sex of but eighteen of our sixty-six species; though in some cases it must be owned that the reference is probably more arbitrary than natural, since it is based entirely on the similarity of structural characters. Of these I have been enabled to supply four or five, together with the descriptions of one or two species new to science.

In Guernsey, Luff has once or twice taken *H. pulchellus*, Grav. (*cf.* Trans. Guern. Soc. 1903), a species not yet noted in Britain; and unnamed species of *Hemiteles* have been bred from *Dianthecia capsicola* and *Lithocolletis Schreberella* (Entom. 1881, p. 139), and from *Microgaster intricatus* (Haliday, Ent. Mag. ii. p. 468).

Hemiteles rufipes, Bridg., and *H. tibialis*, Bridg., are recorded from Norfolk (Trans. Norf. Soc. 1894, pp. 614, 615). These, I think, must be MS. names, since I can find them nowhere described. The former is certainly not *Hemimachus rufipes*, Bridg., which is referred to later in the same paper, nor is it *Hemiteles rufipes* described by Taschenberg from Brazil (Zeits. Ges. Nat. xlviii. p. 961). The *H. zonatus* of Bridg.-Fitch (Entom. 1883, p. 103) is the male of *Pezomachus zonatus*, Först. Schmiedeknecht in 1905 records *H. rufulus*, Thoms., from England, but I know of no justification for this and presume it to be a *lapsus calami* for *Cecidonomus rufus*, Bridg. (*inimicus*, Gr.); it is, however, not unlikely to occur with us, since it is found in both Sweden and Germany.

Table of Species.

(2).	1. Areolet with the outer nervure sub-entire	1. PULLATOR, Grav.
(1).	2. Areolet with the outer nervure obsolete or wanting.	
(4).	3. Areolet sub-pyramidal	2. INUSTUS, Grav.
(3).	4. Areolet, including supposititious nervure, pentagonal.	
(20).	5. Pronotum centrally carinate and laterally foveate.	
(11).	6. Second segment impressed; nervellus not or faintly intercepted.	
(10).	7. Basal segment broad; the second evenly scabriculous.	
(9).	8. Incisures not or hardly pale; ♂ valvulae prominent	3. FULVIPES, Grav.
(8).	9. Incisures distinctly pale; ♂ valvulae normal	4. MARGINATUS, Bridg.
(7).	10. Basal segment slender; the second longitudinally scabriculous	5. SUBMARGINATUS, Bridg.
(6).	11. Second segment not impressed; nervellus distinctly intercepted.	
(13).	12. Basal metathoracic area triangular; second segment trans-striate	6. SCABRICULUS, Thoms.

- (12). 13. Basal metathoracic area not triangular; second segment punctate.
- (17). 14. Abdomen broadly red centrally.
- (16). 15. Nervellus antefurcal; at least three segments red 7. VARITARSUS, *Grav.*
- (15). 16. Nervellus opposite; at most two segments red..... 8. CAPREOLUS, *Thoms.*
- (14). 17. Abdomen black or only the incisures pale.
- (19). 18. Clypeus densely tomentose; anterior coxae white 9. CONFORMIS, *Gmel.*
- (18). 19. Clypeus normal; anterior coxae not white 10. INFIRMUS, *Grav.*
- (5). 20. Pronotum not carinate nor foveate.
- (22). 21. Nervellus not intercepted; pedicellus white 11. NECATOR, *Grav.*
- (21). 22. Nervellus intercepted; pedicellus not or rarely white.
- (110). 23. Nervellus distinctly antefurcal (or mandibles basally tuberculate).
- (31). 24. Thorax partly red; wings distinctly fasciated.
- (26). 25. Areolet internally irregular; head always, abdomen often, black 12. BICOLORINUS, *Grav.*
- (25). 26. Areolet internally regular; head often, abdomen always, red-marked.
- (30). 27. Basal segment short and broad; metathoracic areae indistinct.
- (29). 28. Tibiae not distinctly white; terebra nearly length of abdomen
- (28). 29. Tibiae pure white basally; terebra much shorter than abdomen 13. LONGICAUDA, *Thoms.*
- (27). 30. Basal segment elongate; metathoracic areae distinct 14. AREATOR, *Panz.*
- (24). 31. Thorax black; wings not or hardly fasciated.
- (39). 32. Clypeus apically dentate (ISADELPHUS, *Först.*)
- (38). 33. Metathoracic areae entire; petiole apically explanate.
- (37). 34. Hind tibiae white-banded.
- (36). 35. Clypeus discreted; second segment scabrous; terebra length of abdomen 15. CINGULATOR, *Grav.*
- (35). 36. Clypeus not discreted; second segment rugose; terebra shorter 16. PICTIPES, *Grav.*
- (34). 37. Hind tibiae not white-banded ... 17. VARICOXIS, *Tasch.*
- (33). 38. Metathoracic areae obsolete; petiole linear ... 18. CASTANEUS, *Tasch.*
- (32). 39. Clypeus not apically dentate.
- (41). 40. Flagellum very stout; abdomen totally glabrous 19. PEDESTRIS, *Fab.*
20. SUBZONATUS, *Grav.*

- (40). 41. Flagellum normal; abdomen sculptured.
- (71). 42. Abdomen black or piceous, at most with incisures pale.
- (52). 43. Central incisures distinctly pale.
- (45). 44. Antennae tricoloured 21. *CONTAMINATUS*, Grav.
- (44). 45. Antennae not tricoloured.
- (49). 46. Central segments neither callose nor nitidulous.
- (48). 47. Post-petiole aciculate; petiolar area entire..... 22. *INCISUS*, Bridg.
- (47). 48. Post-petiole not aciculate; petiolar area discreted 23. *BRUNNEUS*, Morl.
- (46). 49. Central segments apically sub-callose and nitidulous.
- (51). 50. Costulae obsolete; three basal incisures pale 24. *LIMBATUS*, Grav.
- (50). 51. Costulae strong; central incisures alone pale 25. *FLORICULATOR*, Grav.
- (43). 52. Central incisures rarely obsoletely pale.
- (54). 53. Segments five to seven mainly white, the second rugosely punctate..... 26. *ALBOMARGINATUS*, Bridg.
- (53). 54. No segments white, nor the second rugosely punctate.
- (56). 55. Second segment very coarsely striate..... 27. *NIGER*, Tusch.
- (55). 56. Second segment not striate.
- (66). 57. Lateral metathoracic costae wanting.
- (59). 58. Metathorax punctulate with pleurae scabrous..... 28. *MELANOASTER*, Thoms.
- (58). 59. Metathorax sub-rugose, with pleurae not scabrous.
- (61). 60. Stout; metanotum transversely rugose 29. *TRISTATOR*, Grav.
- (60). 61. Normal; metanotum not transversely rugose.
- (63). 62. Epipleurae not inflexed; flagellum very slender 30. *SORDIPES*, Grav.
- (62). 63. Epipleurae acutely inflexed; flagellum normal.
- (65). 64. Second segment finely punctate; post-petiole longer 31. *CYNIPINUS*, Thoms.
- (64). 65. Second segment glabrous; post-petiole sub-quadrate 32. *SIMILIS*, Gmel.
- (57). 66. Lateral metathoracic costae entire.
- (70). 67. Central segments confluent punctate and apically callose.
- (69). 68. Basal nervure vertical; scrobes auriculate 33. *AURICULATUS*, Thoms.
- (68). 69. Basal nervure oblique; scrobes normal 34. *MELANARIUS*, Grav.
- (67). 70. Central segments sub-glabrous... 35. *OBSCURUS*, Bridg.
- (42). 71. Abdomen more or less broadly rufescent.
- (73). 72. Segments transversely impressed; ♀ hind tibiae inflated 36. *LAEVIGATUS*, Ratz.

- (72). 73. Segments with no impression ; hind tibiae normal.
- (75). 74. Base of abdomen entirely red ... 37. *BIANNULATUS*, *Grav.*
- (74). 75. Base of abdomen at least black.
- (87). 76. At most two central segments pale.
- (80). 77. Second segment longitudinally striate or aciculate.
- (79). 78. Second segment alone striate ... 38. *HEMIPTERUS*, *Fab.*
- (78). 79. Second and third segments aciculate..... 39. *SCRUPULOSUS*, *Grav.*
- (77). 80. Second segment glabrous or punctate.
- (84). 81. Metathorax with transverse costae ; abdomen punctulate.
- (83). 82. Clypeus distinctly discreted ; mouth parts white 40. *CHIONOPS*, *Grav.*
- (82). 83. Clypeus not discreted ; mouth parts not white 41. *RUFOCINCTUS*, *Grav.*
- (81). 84. Metathorax with no distinct costae ; abdomen totally glabrous.
- (86). 85. Post-petiole aciculate ; antennae tricoloured..... 42. *VARICORNIS*, *Grav.*
- (85). 86. Post-petiole scabriculous ; antennae bicoloured 43. *DUBIUS*, *Grav.*
- (76). 87. More than two segments pale.
- (103). 88. Metathorax rugulose with apophyses sub-acute.
- (90). 89. Front tibiae sub-inflated ; lateral metathoracic costae wanting... 25. *FLORICULATOR*, *Grav.*
- (89). 90. Front tibiae normal ; lateral metathoracic costae usually entire.
- (94). 91. Post-petiole rugose or punctate.
- (93). 92. Basal segment carinate and the central callose 44. *RIDIBUNDUS*, *Grav.*
- (92). 93. Basal segment not carinate nor the central callose 45. *BALTEATUS*, *Thoms.*
- (91). 94. Post-petiole aciculate.
- (98). 95. Petiolar area oblique.
- (97). 96. Coxae and trochanters black ... 46. *IMBECILLUS*, *Grav.*
- (96). 97. Coxae and trochanters red..... 47. *PERSECTOR*, *Parf.*
- (95). 98. Petiolar area sub-vertical.
- (100). 99. Segments two to six red 48. *TENUICORNIS*, *Grav.*
- (99). 100. Segments two to four red.
- (102). 101. Second segment nearly smooth ; post-petiole narrower 49. *OXYPHIMUS*, *Grav.*
- (101). 102. Second segment punctate ; post-petiole broader..... 50. *MERIDIONALIS*, *Grav.*
- (88). 103. Metathorax punctate or smooth with apophyses obsolete.
- (107). 104. Frons and mesonotum pubescent and dull.
- (106). 105. Head, thorax and abdomen sub-glabrous..... 51. *MACRURUS*, *Thoms.*
- (105). 106. Head and thorax pubescent, abdomen finely punctate 52. *ARGENTATUS*, *Grav.*
- (104). 107. Frons and mesonotum nitidulous.
- (109). 108. Flagellar joints apically incrassate ; anus black 53. *NITIDUS*, *Bridg.*

- (108). 109. Flagellar joints cylindrical ; anal segments white..... 54. *DECIPIENS*, *Grav.*
- (23). 110. Nervellus post-furcal (post-petiole usually elongate and slender).
- (112). 111. Lower angle of brachial cell obtuse ; median nervure emitted above centre..... 55. *STAGNALIS*, *Thoms.*
- (111). 112. Lower angle of brachial cell acute ; median nervure emitted below centre.
- (114). 113. Second segment evenly and distinctly, also basal, punctate ... 56. *AESTIVALIS*, *Grav.*
- (113). 114. Second segment not distinctly punctate, basal often sub-aciculate.
- (118). 115. Flagellum tricoloured.
- (117). 116. Metathorax coarsely rugose ; second segment totally glabrous 42. *VARICORNIS*.
- (116). 117. Metathorax not rugose ; second segment obsoletely punctate... 57. *HADROCERUS*, *Thoms.*
- (115). 118. Flagellum not tricoloured.
- (120). 119. Petiolar area distinctly oblique... 46. *IMBECILLUS*.
- (119). 120. Petiolar area sub-vertical.
- (124). 121. Nervellus not intercepted.
- (123). 122. Abdomen black, with anterior legs piceous 58. *MINUTUS*, *Bridg.*
- (122). 123. Abdomen centrally, and the legs, pale..... 59. *GRACILIS*, *Thoms.*
- (121). 124. Nervellus intercepted.
- (126). 125. Pedicellus internally dentiformly produced 60. *MICATOR*, *Grav.*
- (125). 126. Pedicellus not produced.
- (128). 127. Antennae white-banded ; abdomen somewhat dull 61. *SUBANNULATUS*, *Bridg.*
- (127). 128. Antennae not white-banded ; abdomen usually nitidulous.
- (130). 129. Wings strongly and evenly clouded 49. *OXYPHIMUS*.
- (129). 130. Wings not or unevenly clouded.
- (132). 131. Post-petiole scabriculous ; abdomen totally glabrous 43. *DUBIUS*.
- (131). 132. Post-petiole glabrous or aciculate ; abdomen usually punctulate.
- (134). 133. Three basal segments red, finely and distinctly punctate 62. *MELANOPYGUS*, *Grav.*
- (133). 134. Only central segments red-marked, not or obsoletely punctate.
- (140). 135. Mesonotum dull and usually pubescent.
- (139). 136. Second segment nearly glabrous.
- (138). 137. Areola distinct ; fenestra confluent 57. *HADROCERUS*.
- (137). 138. Areola wanting ; fenestra distinctly discreted 63. *ANGLICANUS*, *Morl.*
- (136). 139. Second segment aciculate throughout 64. *DISTINCTUS*, *Bridg.*

- (135). 140. Mesonotum nitidulous and sub-glabrous.
 (142). 141. Second segment sub-punctulate ;
 ♀ flagellum incrassate..... 65. *VALIDICORNIS*, *Thoms.*
 (141). 142. Second segment totally glabrous ;
 flagellum filiform 66. *POLITUS*, *Bridg.*

1. *pullator*, *Grav.*

Cryptus pullator, Gr. I. E. ii. 584, ♀. *Phygadeuon pullator*, *Tasch. Zeits. Ges. Nat.* 1865, p. 29, ♀. *Hemiteles pullator*, *Thoms. O. E. xxi.* 2388 ; *Schm. Term. Füz.* 1897, p. 553, ♂ ♀.

Head with the mouth dull stramineous. Antennae infusate with the scape entirely and flagellum beneath red. Metathorax with complete areae. Abdomen black with the second and third segments broadly red or testaceous basally, darker in ♂ ; terebra about half the length of the abdomen. Legs stramineous or fulvidous ; darker in ♂. Wings ample, sub-hyaline ; stigma piceous, radix and tegulae whitish ; areolet entire, pentagonal but with the outer nervure sub-pellucid ; nervellus intercepted below the centre. Length, 4–5 mm.

Thomson, whom Schmiedeknecht copies in his inadequate description of the ♂, says this species is very like *H. gracilis*, but that the head is less narrowed behind the eyes, the clypeus less elevated, the areolet entire, the nervellus antefurcal, and that the two pale segments bear an apical black shade.

This species was introduced as British by Marshall in 1870, but I know of no indigenous records ; it is only found in Germany and Sweden on the Continent and has not yet been bred. (Cf. *Phygadeuon bitinctus*, p. 92 *ante*).

2. *inustus*, *Grav.*

Hemiteles inustus, Gr. I. E. ii. 828 ; *Schm. Term. Füz.* 1897, p. 517, ♂.

Abdomen black ; second segment except a large discal mark, and the basal angles of the third, red. Anterior legs red, with the coxae basally infusate ; intermediate femora dark-marked above ; hind legs black with the trochanters, tarsi, base of femora and of tibiae, ferrugineous. Wings slightly clouded ; stigma black, with its extreme base white ; tegulae infusate, radix white ; areolet pyramidal-pentagonal with the outer nervure sub-obsolete. Length, 6 mm.

Bridg-Fitch very truly remark (*Entom.* 1883, p. 105) that Gravenhorst's description is utterly inadequate, since it refers solely to the indistinctive coloration of the abdomen, legs and wings, its only pertinent point being the shape of the areolet. They surmise it to refer to the ♂ of some *Pezomachus*, to which Gravenhorst's bare mention of its similarity with *Hemimachus palpator* lends probability. I should consequently have omitted this "name," were it not that Schmiedeknecht re-described it in 1897 to such an extent—overlooking, however, the shape of the areolet—that the species should, I think, be ascribed to him rather than to his predecessor. I give their useless description, since its name has figured in the British lists, for what it is worth !

3. *fulvipes*, Grav.

Hemiteles fulvipes, Gr. I. E. ii. 792; Ratz. Ichn. d. Forst. i. 150; iii. 151, pl. vii. fig. 6; Tasch. Zeits. Ges. Nat. 1865, p. 124; Thoms. O. E. x. 968¹; Schm. Term. Füz. 1897, p. 506, ♂ ♀; cf. Bridg. Trans. Ent. Soc. 1883, p. 56. Var. (?) *H. socialis*, Ratz. Ichn. d. Forst. i. 151, ♂; ii. 168; iii. 152, ♂ ♀; cf. Brisch. Deut. Ent. Zeit. 1877, p. 287.

Head with the mouth stramineous, frons dull and genal costa continuous; clypeus mutic, discreted, short, apically straight and centrally reflexed; mandibles basally geniculate, with the lower margin sinuate. Antennae setiform, longer than half the body, with the scape excised and sub-globose; of ♀ fusiform-setaceous with the scape usually red beneath, of ♂ with the scape pale citrinous at least beneath and the three following joints gradually darker. Thorax gibbulous; pronotum with a short central carina terminating on either side in a deep fovea; mesonotum dull, coriaceous, densely and very finely pubescent; metathorax confusedly rugose, with two distinct transverse costae, the areae not very distinct, areola apically acuminate and basally rounded. Abdomen ovate, deplanate, as broad as the thorax; basal segment densely and very finely striate with no tubercles, gradually strongly dilated towards the apex, only basally bicarinate and, especially in ♂, a little longer than apically broad; second and third segments centrally transversely impressed; terebra one-fourth the length of the abdomen; ♂ with two red, curved and far-exserted anal styles. Legs normal, flavous; the anterior coxae and trochanters stramineous, hind ones black with the trochanters white; hind tibiae at base and apex, and the ♂ tarsi, infusate. Wings normal, sub-hyaline; stigma pale piceous, emitting the radial nervure from its centre; tegulae and radix white; areolet pentagonal with the outer nervure very fine or obsolete; discoidal cell apically acute; nervelet indicated, nervellus ante-furcal and not intercepted. Length, 3-4 mm.

Bridgman says (*loc. cit.*) it is distinguished from his *H. submarginatus* by the points enumerated under the latter species, and calls attention to the ♂ anal forceps, which are of very unusual length and recall those found in the Ophionid genus *Mesochorus*.

Hemiteles socialis differs somewhat extensively from the type form in its stronger abdominal sculpture, that of the second segment becoming even granulate and sub-rugose. At Easton Broad in Suffolk, late in September, 1900, I swept a small ♀ *H. fulvipes* with piceous legs and the basal segments dully coriaceous with their apical margins glabrous and sub-callose. It appears to vary considerably.

The economy of *H. socialis* is somewhat fully described by Ratzeburg (*loc. cit.*): Nordlinger first bred it from the yellow cocoons of *Microgaster crataegi*, which were clustered on the underside of a larva of *Pieris brassicae*; it emerges in the middle of September. Subsequently fifteen specimens emerged at the end of June from twenty cocoons of *Apanteles octonarius*, parasitic upon *Lithosia quadra*, in about twelve days. Ratzeburg supposed the *Hemiteles* to oviposit in the larvae of the *Apanteles* during the few hours they lie exposed, between emerging from their host and spinning their own cocoon; but Brischke (*loc. cit.*) says that he took at the beginning of August, 1871, a ♀ *H. fulvipes* running busily among

¹ Thomson's "*fulvipes*, Grav." (O. E. 854) is a *lapsus calami* for *rufipes*.

a mass of *Microgaster glomeratus* cocoons beneath a rose leaf; on the following day the female was dead, and in less than three weeks one ♂ and twenty-nine ♀♀ *H. fulvipes* emerged from the cocoons. Though the *Hemiteles* themselves are hyperparasitic, they in their turn are destroyed by two species of Chalcids, *Entedon vinulae* and *Pteromalus Boucheanus* to such an extent that Tischbein observed that although all the *Microgaster*s of a brood were destroyed, all the *Hemiteles* except only one shared the same fate at the hands of the Chalcids.

This species is a common parasite in *Microgaster*id cocoons and one of the most abundant species of the genus in the palaearctic zone. Gravenhorst took the male on *Rubus* flowers in October, and Nees the female among fallen leaves in the autumn; Taschenberg records it as bred from *Microgaster* pupae ex *Lasiocampa pini* and from spiders' nests. It is said to be common in Norfolk and bred from cocoons of *Apanteles congestus* and from *Cymatophora* or, by W. Fletcher (Bridgman), bred early in April from the pupa-case of *Vanessa atalanta* in Devon, and found at Bickleigh on 16th September (Bignell), Adkin has bred it from a spider's nest at Leigh in Essex (E.M.M. 1890, p. 249) and Wainwright through *Apanteles* sp. from a Noctuid larva. Armagh (Johnson, Irish Nat. 1904, p. 256); Maldon in Essex (Fitch). It has been bred from *Zygaena filipendulae*, *Plusia chrysitis*, *Pieris rapae*, through *Apanteles zygaenarum*—see also Bignell's Devon Braconids, p. 15—from *Melitaea artemis* and through *Apanteles* sp. from *Arctia villica* (Buckler). On *Clostera anastomosis* and, through a *Microgaster*, on *Liparis dispar* (Giraud). Marshall bred it from *Apanteles glomeratus* upon *Pieris brassicae* (Bracon. d'Europ. i. 422), and says that every one of the parasites' cocoons yielded a single female of the hyperparasite, which has been reared from spiders' eggs (Ent. Ann. 1874, p. 124). It has also been recorded as hyperparasitic upon *Hadena oleracea* through *Apanteles spurius* (Bridg.-Fitch); *Bombyces* through *A. ordinarius*, Ratz. (Marsh. i. 412); *Vanessa urticae*, *Selandria pusilla*, *Diloba caeruleocephala*, *Plusia gamma*, *Zygaena trifolii* and *Euchelia jacobaeae* (Brischke). Chitty has taken it at Doddington in Kent, Dr. Cassal upon lilac at Ashby near Doncaster, in May, and Bignell at Yelverton, in August; there are several in Capron's collection, probably from Shere, and I have captured it, always on house-windows, at Southwold late in September, and in Ipswich in the middle of April.

4. *marginatus*, Bridg.

Hemiteles marginatus, Bridg. Trans. Ent. Soc. 1883, p. 144; Schm. Term. Füz. 1897, p. 518, ♂ ♀.

Head sub-buccate, nitidulous, finely punctate and hardly contracted posteriorly. Antennae filiform, as long as the body, with the scape stramineous beneath; of ♀ distinctly pilose, hardly incrassate apically, with the two basal flagellar joints sub-equal and thrice longer than broad. Thorax rather longer than high; mesonotum dull, finely and densely punctate, scabriculous between the obsolete notauli; metathorax nitidulous, areola strongly elongate with the transverse costae distinct, costulae obsolete, lateral areae longitudinally striate; petiolar area very narrow, discreted and nearly vertical. Scutellum shining and very sparsely punctate. Abdomen with all the segments, except the first, narrowly stramineous apically, of ♀ elongate-ovate and nitidulous, of ♂ sub-cylindrical and

pubescent; basal segment gradually explanate throughout, spiracles not prominent, of ♀ densely and of ♂ obsoletely aciculate; second segment confluent punctate longitudinally, of ♂ quadrate and of ♀ transverse; third distinctly punctate; apical margins of the first three segments transversely sub-impressed, sub-callose and, together with the remainder of the abdomen, glabrous; terebra one-third the length of the abdomen. Legs slender, pale fulvous, with the trochanters and anterior coxae flavous; sometimes the tarsi, posterior femora and tibiae, apically infusate. Wings with the areolet externally incomplete; tegulae, stigma and radix stramineous; nervellus indistinct, antefurcal. Length, 4-5 mm.

Bridgman says this species is rendered distinct by the peculiarly elongate and often indistinct areola, the pale margin of all the segments and the longitudinal puncturation of the second; but it is very closely allied to *H. fulvipes* and *H. submarginatus* in its carinate and foveate pronotum, and impressed segments; the antennae are, however, longer and the areola less distinctly defined; it has the pale incisures of the latter and the broad post-petiole of the former. I am strongly of opinion that these three species are but forms of a single one.

The types of this species were taken by Peter Cameron, probably near the Clyde; and I possess others from Surrey and Hertfordshire in Capron's and Piffard's collections. Schmiedeknecht tells us it has been bred from *Chrysocorys festaliella*.

5. submarginatus, Bridg.

Hemiteles submarginatus, Bridg. Trans. Ent. Soc. 1883, p. 143; Schm. Term. Füz. 1897, p. 507, ♂ ♀.

Head transverse, slightly narrowed posteriorly, somewhat shining, very finely and closely punctate; clypeus indistinctly discreted from the pubescent face; mandibles stramineous with the upper tooth only slightly the longer. Antennae of ♀ sub-fusiform, with the basal flagellar joint about thrice longer than broad, the second and third of equal length; of ♂ filiform, somewhat shorter than the abdomen; scape more or less stramineous beneath. Thorax dull, finely reticulate; mesonotum with the notauli reaching the centre; metathorax somewhat short, with two curved transverse costae and fine longitudinal aciculation; an anteriorly curved and explanate areola sometimes indicated by lateral costae; petiolar area discreted. Abdomen elongate, with the central incisures sub-stramineous, of ♀ sub-ovate; basal segment aciculate throughout, thrice longer than apically broad, wider in ♀; spiracles not prominent; post-petiole obsoletely bicarinate; second segment basally scabriculous longitudinally; ♂ styles not produced; ♀ terebra one-third the length of abdomen. Legs slender, stramineous, with the front coxae mainly and the apices of the intermediate, as well as part of the trochanters, flavous; hind coxae black and the posterior legs infusate. Wings with the radix stramineous and the stigma paler; areolet pentagonal with the outer nervure wanting; transverse anal not strong but distinctly intercepted below the centre, at least in ♀. Length, 3 mm.

This species resembles *H. fulvipes* in colour, contour and the sub-fusiform ♀ antennae, but is rendered distinct by its much narrower basal

segment, usually pale incisures, the longer ♀ three basal flagellar joints and the concealed ♂ anal styles.

Bridgman bred this species from *Microgaster* cocoons taken in the neighbourhood of Norwich; he adds Mousehold in Norfolk as the locality and says it has been bred from the cocoons of *Apanteles conjestus*. Hyperparasitic, through *Apanteles nothus*, on a grass-feeding larva found at Oreston in Devon, bred 15th August (Bignell); hyperparasitic, through *Apanteles difficilis*, on larva of *Diloba caeruleocephala* (Schm.). Both sexes are represented in Capron's collection, probably taken about Shere; Miss Chawner has also bred both at Lyndhurst; and I have seen seven males, bred with no females, from *Lithocolletis brimiella* at the end of April.

Mr. E. R. Banks has given me a ♂ and two ♀ ♀ of this species bred, together with three ♂ ♂ and two ♀ ♀ of *Elasmus* (?) *flabellatus*, Fonsc., and two ♀ ♀ of some Pteromalid, from May 10th to 20th, 1900 (a pair of the *Elasmus* was *in cop.* at 7-30 a.m. on the 11th; the ♂ *Hemiteles* emerged on the 14th; and the two Pteromalids, which have moniliform and clear flavous antennae with a black apical club, on the 16th). They were bred from larvae of *Lithocolletis Schreberella*, collected on elm near Salisbury, on 9th November, 1899; no Braconids emerged from these hosts.

6. *scabriculus*, Thoms.

Hemiteles scabriculus, Thoms. O. E. x. 969; Schm. Term. Füz. 1897, p. 507, ♂ ♀.

Black. Head with the cheeks sub-buccate and clypeus mutic. Antennae with the scape sub-globose and excised, and the second flagellar joint longer than the first; of ♂ with the joints distinctly discreted, of ♀ sub-filiform with the scape black. Pronotum with the central dorsal carina short, and deeply foveate laterally; mesonotum dull, pubescent and not convex discally; metathorax with two distinct transverse, but only obsolete lateral longitudinal, costae; basal and petiolar areae both triangular, areola basally acuminate, spiracles nearly contiguous with the lateral costae. Abdomen dull, with the sides and apices of the segments narrowly rufescent, of ♂ mainly black; post-petiole densely and very finely aciculate, apically explanate with no carinae; second segment very finely and transversely aciculate; terebra shorter than the first segment. Legs testaceous, with the anterior trochanters flavidous and the posterior coxae, femora and tarsi piceous; of ♂ mainly black. Wings not fasciated; stigma infusate, emitting the radial nervure from its centre; areolet internally entire; nervellus intercepted and obviously antefurcal. Length, 4-6 mm.

Similar in its antefurcal nervellus, etc., to *H. infirmus*, *varitarsus* and *conformis*, but at once distinguished from them by its triangular basal area and filiform ♀ flagellum.

Thomson considerably qualifies his description by adding that it is possibly the same species as *H. tristator*, Grav.

This species has hitherto only been elsewhere found in Sweden. Bridgman records (Trans. Ent. Soc. 1886, p. 340) a female from the neighbourhood of Norwich, which was named by Professor Thomson, and he says he took it at Eaton in Norfolk, in July. I possess three females captured by Piffard at Felden in Herts., and two by Capron at Shere in Surrey.

7. *varitarsus*, Grav.

Hemiteles varitarsus, Gr. I. E. ii. 823; Tasch. Zeits. Ges. Nat. 1865, p. 124, ♀; Holmgr. Sv. Ak. Handl. 1854, p. 58; Thoms. O. E. x. 969; Schm. Term. Fitz. 1897, p. 507, ♂ ♀.

Head black with the vertex convex and, in ♀, hardly narrowed behind the eyes; clypeus reflexed and apically rounded; palpi and labrum flavous, mandibles red. Antennae filiform and somewhat slender, hardly shorter than the body and very slightly incrassate before the apices; the two basal flagellar joints sub-equal in length, and apically slightly nodulose; of ♀ fusiform, with the scape sometimes ferrugineous beneath. Thorax dull, reticulate and pubescent; mesonotum not deplanate, notauli only anteriorly distinct; metathorax scabriculous with strong costae and the areola hexagonal, broadest apically; the basal area not triangular, of ♀ transverse, of ♂ elongate; lateral costae very distinct. Abdomen oblong, as broad as the thorax, densely punctulate and somewhat dull; black, with the three central segments and sometimes the base of the fifth bright red; basal segment not strongly curved, sub-linear, punctulate and strongly bicarinate throughout its whole length, with its apex not explanate, tubercles obsolete and distinctly before the centre; post-petiole parallel-sided; second segment punctulate, anus nitidulous with scattered pubescence; terebra shorter than the first segment, with spicula and the ♂ valvulae red. Legs normal, bright red; hind ones with the coxae except at apex, and the apices of the posterior femora, tibiae and tarsal joints, deep black. Wings hyaline; stigma except basally, and the nervures, piceous, radix whitish and tegulae testaceous; nervellus intercepted and evidently antefurcal. Length, 4-5 mm.

This species is said by Thomson to be similar to *H. fulvipes* in its pronotal carina, mutic clypeus, densely pubescent mesonotum, metathoracic sculpture, venation, excised scape, etc., but the cheeks are buccate, the costellae elongate, petiolar area discreted and reaching high on the disc, the central segments are red and become gradually more finely punctate; above all the nervellus is intercepted. The pale legs with deep black apices of their joints are very distinctive.

It is widely distributed in northern and central Europe and was introduced as British in 1870, but I have seen but few examples of it: one ♀ was found among Capron's unnamed specimens and ♂ taken by myself on 26th August, 1899, on the flowers of *Angelica sylvestris* at Claydon bridge, near Ipswich. On 17th September, 1900, I found a nest of some species of *Epeira* upon a blade of dead grass in the Reydon marshes, near Southwold; it was about two feet from the ground and contained many eggs, together with three parasitic larvae, the whole being comprised in a spindle-shaped, smoke-coloured web of close texture. The larva is of the



fig. 1.



fig. 2.



fig. 3.

shape and size here depicted (figure 1); the skin is semi-transparent, somewhat dull, extremely finely alutaceous and whitish, especially along its lateral fold; the capital extremity is whiter and duller than the remainder, and the mouth parts are outlined as in figure 2. The disc

of the head is quite white and somewhat uneven. There are thirteen segments, which are distinctly discreted; the fifth to the ninth bear obvious dorsal prolegs, marked with black points. There is an apparently irregular distribution of the white sub-cutaneous granules. On the 18th one of these larvae had fallen out of the web and the other two had begun to spin cocoons for themselves within that of the spider and were preparing to pupate, since all the spiders' eggs upon which they had been subsisting were sucked quite dry, only the old husks remaining. On the 22nd the loose larva was still quite lively, but had changed its colour to primrose and pink, and it subsequently died; the other two had now completed their cocoons, which were spun within that of the spider and were white throughout, parallel-sided and slightly wrinkled longitudinally as in figure 3. On 12th May, 1901, one female *Hemiteles varitarsus* (described above) emerged from one of these two cocoons, the second specimen having apparently died during the winter. In Marshall's collection (in Brit. Mus.) are specimens from Niton in the Isle of Wight, Leicester and Botusfleming, together with a spider's nest affixed to a grass-stem from which the imago or imagines had emerged. Beaumont took a male at Coshane in the middle of July, 1891 (in coll. Chitty).

8. *capreolus*, Thoms.

Hemiteles Capreolus, Thoms. O. E. x. 970; Schm. Term. Füz. 1897, p. 507, ♂ ♀.

Head narrowed behind the eyes; peristomium small, frons nitidulous, vertex large and centrally angularly emarginate; mandibles red, genal costa continuous; clypeus mutic. Antennae elongate, of ♀ fusiform-setaceous; scape excised and sub-globose. Thorax black; pronotum with a short central carina, laterally foveate; mesonotum dull; metathorax with two distinct transverse, but obsolete longitudinal, costae. Abdomen with the second, and in ♀ also third, segment red; post-petiole closely aciculate; terebra hardly longer than the basal segment. Legs red, hind ones fuscous-marked; anterior trochanters flavidous. Wings not fasciated; radial nervure emitted from almost beyond the centre of the pale stigma; nervellus opposite and intercepted. Length, 4-5 mm.

At once known from *H. infirmus*, *scabriculus*, etc., by the opposite nervellus, posteriorly narrowed head, glabrous frons and emarginate vertex.

Bridgman took the male near Norwich and tells us that Dr. Capron captured the female at Shere, but I do not find it in his collection (*mus. mei*); these specimens were both confirmed by Thomson, who originally bred the species from rose-galls (? *Rhodites rosae*). Bignell records it from Plym bridge and Oreston in Devon, in August and September, but elsewhere it appears to have only been mentioned from Sweden.

9. *conformis*, Gmel.

Ichneumon conformis, Gmel. S. N. i. 2720, ♀. *Hemiteles conformis*, Gr. I. E. ii. 803; Tasch. Zeits. Ges. Nat. 1865, p. 126, ♀; Thoms. O. E. x. 969; Schm. Term. Füz. 1897, p. 509, ♂ ♀.

Head with the mouth dull stramineous; clypeus densely clothed with pale hairs, indistinctly discreted and apically truncate; frons nitidulous. Antennae filiform, infusate with the two basal joints testaceous beneath; of the ♂ elongate. Metathorax centrally longitudinally rugose, with two

distinct transverse costae and the lateral ones indistinct; petiolar area discreted. Abdomen with the segments apically and laterally red; the basal gradually explanate and aciculate throughout, with no tubercles; the two following closely and confusedly punctate; terebra one-third the length of the abdomen. Legs pale red; anterior coxae and trochanters white; hind legs with the coxae basally black and their tarsi, apices of tibiae and a band before their base, infusate. Wings not clouded; stigma and costa stramineous, radix and tegulae white; areolet pentagonal with the outer nervure nearly wanting. Length, 3-5 mm.

Closely allied to *H. varitarsus* and *H. infirmus* in the not triangular basal metathoracic area, ♀ fusiform antennae, intercepted and evidently antefurcal nervellus, but differing in its densely tomentose clypeus and in its sub-quadrate and uniformly punctate second and third segments.

It is said to occur in August, and has been bred in Lynn in Norfolk by Atmore from *Lithocolletis Frölichella* (Bridgman), and captured at Bickleigh in Devon, in June and September (Bignell). It has a limited Continental range from Sweden to Prussia, where Brischke bred a variety of this species hyperparasitically, through *Microgaster* sp., from *Diloba caeruleocephala*, *Acronycta psi* and *Botys verticalis* (Bridg.-Fitch.).

10. *infirmus*, Grav.

Hemiteles infirmus, Gr. I. E. ii. 797; Tasch. Zeits. Ges. Nat. 1865, p. 126; Schm. Term. Füz. 1897, p. 509; Thoms. O. E. x. 969, ♀.

A slender, shining, black species. Head broader than thorax, with the clypeus distinctly discreted and apically straight; cheeks nitidulous. Antennae filiform, sub-incrassate towards the apices. Metathorax with the basal area not triangular. Abdomen black, oblong-ovate, with the apex of the second segment as broad as the thorax; basal segment towards its apex gradually dilated, canaliculate and twice longer than broad; terebra half the length of the abdomen. Legs flavous; hind ones with the tarsi infusate, apices of tibiae, base of coxae and sometimes the femora above, determinately black. Wings ample and hyaline; stigma large but not broad, testaceous; radix and tegulae white; areolet with the outer nervure nearly wanting. Length, 3-4 mm.

Closely allied to *H. varitarsus*, but differing in its nitidulous cheeks, size of its stigma, red or stramineous apices of the segments, the second being apically punctulate, aciculate or sometimes smooth. From *H. similis* it may be known by its shorter, gradually dilated petiole; and from *H. fulvipes* by its more filiform and slender antennae, longer terebra and narrower post-petiole.

This species was introduced as British by Marshall in 1870, but I know of no details of capture and have recognized no examples of it; on the Continent it is only found in Germany and Sweden.

11. *necator*, Grav.

Hemiteles necator, Gr. I. E. ii. 829; Tasch. Zeits. Ges. Nat. 1865, p. 122; Schm. Term. Füz. 1897, p. 511, ♂ ♀; Ratz. Ichn. d. Forst. iii. 154, ♂.

A small and delicate species with entirely glabrous abdomen. Head sub-buccate and nitidulous, with the vertex somewhat broad; palpi, mandibles and labrum stramineous and the clypeus discreted. Antennae

somewhat slender and filiform, with the pedicellus conspicuously white and the second flagellar joint hardly one-fourth shorter than the first; of ♂ slightly longer than the body, with the basal joints or only the scape stramineous beneath, of ♀ dark ferrugineous with the scape paler beneath. Thorax shining, black, sometimes dull reddish in the ♂; notauli distinct and extending to the centre; metathorax sub-glabrous with white lateral pubescence, costae distinct and areae complete; areola entire and hexagonal or sub-quadrate, broadest basally; apophyses obsolete. Abdomen glabrous and nitidulous, oblong-ovate, nearly parallel-sided and a little narrower than the thorax, of ♂ deplanate, of ♀ convex; second segment, usually base of the third, and in ♂ sometimes the sides of the apical ones, red, testaceous or stramineous; basal linear and only slightly explanate shortly before the apex, nearly four times longer than broad, with inconspicuous spiracles; post-petiole sub-glabrous with obsolete aciculation; terebra half the length of the abdomen. Legs slender and entirely testaceous, with only the claws and apical tarsal joint darker. Wings hyaline and somewhat ample; stigma pale piceous, radix and tegulae bright stramineous; areolet pentagonal with the outer nervure obsolete and the nervellus not intercepted. Length nearly 3 mm.

The male is said to be similar in size and conformation to *H. imbecillus*.

The female of this species is very abundant in Britain in spring and autumn; Beaumont has given it me from Harting in Sussex, in September, Piffard from Felden, Bedwell from Oulton Broad, in October, and Mr. A. C. Bowdler an entirely castaneous specimen from Blackburn. I have captured it in Suffolk at Corton Cliffs and on *Angelica* flowers at Claydon bridge, in August, on house-windows at Southwold in September, beneath willow-bark at Ipswich, in November, and pine-bark at Foxhall, in February beaten it from yew-trees in the Bentley Woods, sparingly in March and commonly in April, on the second of which month I have swept it from water-weeds at Ipswich. Tuck has sent it me from Tostock and Finborough Park, in September, and Bungay, in October, from the same county. Marshall has found it in Yorkshire, Chitty at Doddington and Huntingfield in Kent, and Bignell at Bickleigh in Devon. I once took a female crawling over the stool of a new-felled pine in the Bexhill High Woods in Sussex, in March; but it has not been bred here, though on the Continent Kirchner and Brischke record it from *Limacodes asellus*, *Penthina cynosbana* and, perhaps, *Spilonota ocellana*. It is most probably hyperparasitic.

12. *bicolorinus*, Grav.

Hemiteles bicolorinus, Gr. I. E. ii. 862, ♂ ♀; Holmgr. Sv. Ak. Handl. 1854, p. 59, ♀; Tasch. Zeits. Ges. Nat. 1865, p. 127; Thoms. O. E. x. 979; Schm. Term. Füz. 1897, p. 510, ♂ ♀.

Head black with the mouth alone rufescent; clypeus discreted, cheeks buccate and not smooth, mandibles obviously geniculate; ♂ face not distinctly broader towards mouth. Antennae filiform, ferrugineous, becoming testaceous basally, scape excised and sub-globose; of ♀ rather shorter than half the body, of ♂ more slender and as long as the body. Thorax black with the pronotum and elongate callosities before the radix, sometimes also lateral metathoracic marks and the propleurae, red or castaneous; epomia wanting, notauli inconspicuous; mesosternum not

transverse, mesosulcus and sternauli fine; metathorax feebly rugose, somewhat longitudinally so between the two distinct transverse costae; areola hexagonal, apically acute and usually indistinct laterally. Abdomen narrower than the thorax, dull and closely punctate; black with the three basal segments more or less castaneous basally; of ♂ sub-linear, of ♀ ovate; basal segment confusedly punctate, short, gradually explanate apically, shortly bicarinate, with a slight central furrow and small tubercles; epipleurae of second segment acutely inflexed; terebra about half length of abdomen, ♀ anus whitish. Legs sub-normal, testaceous or stramineous, with most of the femora and hind tibiae infusate, the latter basally pale, though not conspicuously white; calcaria short, tarsal claws small. Wings hyaline, of ♀ with a broad cloud beneath the stigma and a dark central fascia; stigma infusate, radix stramineous, tegulae of variable colour; areolet sub-irregular; lower angle of the discoidal cell acute; nervellus evidently antefurcal. Length, $2\frac{1}{2}$ –5 mm.

This species may be known from its immediate allies by the buccate and not smooth cheeks, short calcaria, inconspicuous lateral metathoracic costae, and its ♀ by the rosy sides and front of the mesothorax.

The sub-irregular areolet, red markings and fasciated wings, relate it with *Spinolia maculipennis*.

It has been commonly bred from various hosts, but especially the case-bearing larvae of various Lepidoptera, throughout Europe. I find records from *Fumea intermediella* and other uninstanced Psychids; from the pupae of *Tinea (Scythropia) crataegella*, *Sc. tenella*, *Coleophora tiliella* (*anatipennella*), *Gastropacha quercus* and *Bombyx neustria*; and Giraud bred it hyperparasitically, through *Microgaster* sp., from *Liparis dispar*. It has been bred in England from the galls of *Cynips Kollari*. This appears, although common enough, to be much less abundant than *H. areator*; it sometimes occurs on umbels in June and oak-trunks in April. I have records from Norfolk; Stonehouse and Bolt Head, in Devon; Ore, Fairlight, Guestling and Hollington, in Sussex; Maldon, in Essex; Felden, in Herts.; Greenings and Shere, in Surrey; Bury St. Edmunds, Tuddenham Fen and Bentley Woods, in Suffolk; Reigate, Worksop, Bristol, Lyndhurst, Acton, Chiswick and Wales. It is often found in houses (e.g., Monks' Soham House, Suffolk), where *Anobium domesticum* is common, but I do not think that association has been established, though it certainly preys upon clothes moths, since Colthrup has bred it, on 9th June, 1904, at Dulwich from *Endrosis fenestrella*.

13. *longicauda*, Thoms.

Hemiteles fasciipennis, Brisch. Schr. Nat. Ges. Danz. 1881, p. 348, ♂ ♀ (*nec* Brullé). *H. longicauda*, Thoms. O. E. x. 980, ♀; cf. Bridg. Trans. Ent. Soc. 1889, p. 417. *H. fasciitinctus*, Dalla Torre, Cat. Hym. iii. p. 649.

Black and dull. Head somewhat narrowed behind the eyes and not red-marked; clypeus discreted. Antennae filiform, with third joint thrice longer than broad; of ♂ black, of ♀ with the third to sixth joints entirely and the following beneath red. Thorax of ♂ black, of ♀ with the whole of the pronotum, most of the mesonotum and the deplanate scutellum red; metathorax convex with complete areae; areola hexagonal and sub-transverse, petiolar area discreted. Abdomen ovate, narrower in ♂; black

with the alutaceous second and third segments, and apex of the first, red; basal segment aciculate-punctate, explanate throughout with carinae indistinct and spiracles prominent; segments four to seven shining and the terebra hardly shorter than the abdomen. Legs red, with the coxae, trochanters, apices of femora, tibiae and the hind tarsi, piceous. Wings of ♀ with two broad piceous fasciae; radix and base of the stigma white, tegulae fulvous. Length, 6–7 mm.

Thomson says his species very closely resembles *H. areator* and *H. bicolorinus*; the ♀ differs from the former in having the head entirely black, the wing-fascia broader and the terebra longer; the ♂ is coloured like *H. bicolorinus*, but the large ocelli and superiorly strongly narrowed face will serve to distinguish it, though this sex is, perhaps, not the same as that described by Brischke. This species, like *H. areator*, differs from *H. bicolorinus* in having a regular, though externally incomplete, areolet and the epipleurae of the second and third segments are acute.

It is very difficult to synonymize the species founded by Thomson on characters referred to by no other author, but the descriptions of *H. fasciipennis* and *longicauda* tally so exactly in every mentioned particular that, as tentatively suggested by Schmiedeknecht, and especially on the evidence of the terebra, I feel justified in uniting them here. The divergence of size is one of small consideration in the present genus.

Bridgman found a female of this species among insects taken by C. W. Dale; he adds that in this example the first segment, part of the second, and nearly the whole of the legs were red; the latter took two specimens at Bournemouth in April, 1867 (*cf.* E.M.M. 1890, p. 24). Brischke bred his species from spiders' nests and *Microgaster* cocoons in Prussia, whence its range extends to Sweden.

14. *areator*, Panz.

Ichneumon areator, Panz. F. G. xciv. 14, ♀. *Hemiteles areator*, Gr. I. E. ii. 855 *et* Suppl. i. 714; Ratz. Ichn. d. Forst. i. 151; ii. 128; iii. 153; Tasch. Zeits. Ges. Nat. 1865, p. 130; Thoms. O. E. x. 980, ♂ ♀. (?) Var. *H. crassiceps*, Ratz. Ichn. d. Forst. i. 151, ♂.

Head of ♂ usually black, with the ocelli large and eyes approximating; of ♀ with the face mainly red, either with the internal and external orbits red and confluent occipitally, or with the discreted clypeus and a central facial dot black; mandibles centrally fulvous, palpi stramineous. Antennae filiform, ferrugineous and becoming apically infusate, with the scape paler. Thorax black, with the prothorax and two mesonotal vittae red; of ♂ red, with the metathorax dorsally black; metathorax closely punctate, with short rugosities along the costae; areola more or less distinct. Scutellum entirely or apically red. Abdomen ovate, as broad as the thorax, dull and closely punctate; basal segments with the margins more or less broadly, the second sometimes mainly, red; basal segment of the ♀ gradually dilated apically, twice longer than broad; post-petiole of ♂ parallel-sided and nearly twice broader than the petiole; terebra not much longer than the first segment. Legs red with the trochanters and femora sometimes infusate above; anterior tibiae usually, hind ones always, basally white, the latter rarely externally nigrescent. Wings hyaline, of ♂ with traces of two infusate fasciae; of ♀ with three dark fasciae, two

becoming confluent on the disc before the centre; stigma black, basally whitish; radix white; areolet regularly pentagonal, with the outer nervure wanting in ♂, and often incomplete in ♀; nervellus evidently antefurcal. Length, $2\frac{1}{2}$ –6 mm.

At once known by its buccate cheeks, apically margined clypeus and broadly red-mottled head and thorax; it differs from *H. bicolorinus* in its regular areolet, which is externally incomplete, the acute epipleurae of the second and third segments and the apically explanate face of, at least, the male. In the ♀ there is constantly a transparent area immediately beyond the stigma, which is wanting in that of *H. bicolorinus*.

I have noticed that the ♀ of this species walks, while searching, somewhat jerkily and elevates her abdomen at every few strides in such a way as to appear to push the wings upwards. This habit is common to the majority of the *Cryptinae*, I believe, as well to some *Diptera*, e.g., the fasciated winged *Tuchistae*, which probably mimic, for protective purposes, the present species. Ratzeburg bred his allied species (perhaps only a variety of the present one), *H. completus*, from *Plinius pectinicornis* in poplar-wood. I once took the female, at night in my study, in December, apparently attracted to artificial light. In April, 1905, a single female emerged through a roughly circular hole, exactly 1 mm. in diameter, pierced low down on the side of a cocoon of *Trichiosoma lucorum* (*tibialis*, Morice) found at Debenham in Suffolk and filled with larvae of *Spilocryptus cimbicis*, from which it had undoubtedly been raised hyperparasitically.

One of the most abundant species of the whole of the Ichneumonidae throughout Europe and occurring everywhere the year round, especially upon thick *Coniferae* in the spring. Panzer first found it on thistles among *Aphides*; Taschenberg says it is bred from larvae of *Platypteryx falcula* and also of *Dermestes*, *Anthrenus* and various *Tineae*; and Thomson records it from the pretty beetle, *Cionus scrophulariae*. Bridgman says it is common in Norfolk and bred from *Trichiosoma betuleti*, *Coleophora fuscedinella* and *Eupoecilia ambiguana*. A common parasite in Devonshire and there bred from the cocoon of *Trichiosoma lucorum*, from several moths' cocoons and hyperparasitically from *Gonepteryx rhamni* through *Limneria vulgaris* (Bignell). Yorkshire (Marshall); Oxshott, Huntingfield and Offchurch Bury (Chitty); a hyperparasite upon *Hybernia progemmaria* (Buckler). Hyperparasitic through a *Microgaster* on *Pieris brassicae*, and bred from *Coleophora nigricella* (Giraud); bred from *Coleophora therinella*, Staint., *C. anatipennella*, Hüb., and *Gelechia albipalpia*, H.S. (Marshall); abundant at Glanvilles Wootton (Dale). It has been bred from *Orgyia pudibunda*, *Lasiocampa pini* (sometimes through *Microgaster ordinarius*, Ratz.—cf. Ratz. et Marsh. Bracon. d'Europ. i. 412), *Dicranura furcula*, *Tortrix viridana*, *Psyche Calvella*, *Fumica intermedella*, *F. affinis*, *Talacporia pseudobombycella*, *Cerostoma costella*, *Hyponomeuta padella*, *H. malinella*, *H. evonymella*, *Gelechia vulgella*, *Coleophora currucipennella*, *Lithocolletis* sp., *Lophyrus pini* or *L. similis*, *Fenusa pumila*, *Trichiosoma betuleti* (through *Cryptus cimbicis*), *Lophyrus pini* (through *Microcryptus basizonius*), *Phycis betulella* (through *Macrocentrus thoracicus*), *Cynips Kollari* galls, *Andricus terminalis* galls, *Chrysopa* sp., *Cecidomyia rosaria*, *Hedobia imperialis* and other xylophagous oak feeding Coleoptera (Bridg.-Fitch, etc.). Rev. C. D. Ash has bred it from *Coleophora viminetella*; Donisthorpe has found it in the burrows of *Anobium dentissile*,

in March ; and Marshall tells us (Brit. Braconidae) that it is hyperparasitic through *Meteorus ictericus*, which is itself sometimes a hyperparasite.

I possess examples from Surrey, Suffolk, Middlesex, Sussex, Essex, Herts., Notts., York, Kent, Ayrshire and Carnarvon ; and have seen it also from Hants., Renfrewshire, Warwick, Oxford, Dunfermline, Langton Herring and Devonshire. Bankes has given me both sexes bred at Bexley from *Coleophora ardeafennella*, Scott, in July, probably through a small *Pimpla* which emerged at the same time ; and Sich a female from Middlesex pupa of *C. anatipennella*, and a male from Clandon pupa of *C. ibipennella*. Chapman has bred it from *Depressaria thapsiella* at Taormina, in Sicily. I took it in February, 1899, associating, though perhaps accidentally, with *Phloeopora reptans* beneath pine bark near Ipswich ; and hibernating in burrows in holly alongside larvae of *Raphidia notata*.

15. *cingulator*, Grav.

Hemiteles cingulator, Gr. I. E. ii. 858, ♀ ; Holmgr. Sv. Ak. Handl. 1854, p. 58 ; Tasch. Zeits. Ges. Nat. 1865, p. 136 ; Thoms. O. E. x. 974, ♂ ♀.

Head black, with the mouth rufescent and the clypeus discreted. Antennae of the ♀ slender and filiform, with the joints discreted, hardly shorter than the body, basal half testaceous, becoming darker apically ; of ♂ elongate, black, with the joints not discreted. Thorax black with the prothorax, usually the mesopleurae and very rarely the scutellum, with disc of the closely and coarsely punctate metathorax, sometimes castaneous or testaceous ; areola hexagonal and often slightly rounded apically, areae distinct ; petiolar area oblique and sub-scabriculous ; apophyses very distinct. Abdomen of ♂ black, of ♀ piceous, ovate, shortly pubescent and as broad as the thorax, with the two basal segments either black with the incisures indeterminately castaneous, or red with an infuscate fascia, the following usually apically, and the apical segment entirely, red ; basal segment strongly elongate, aciculate and slightly impressed apically, of ♂ closely punctate ; post-petiole only slightly longer than broad, with somewhat prominent spiracles ; second segment also aciculate ; terebra very short. Legs slender ; of ♀ testaceous with the hind tibiae mainly, generally their femora and base of their coxae, nigrescent ; of ♂ with all the coxae and the hind legs black, except a white basal tibial band. Wings normal ; of ♀ with a broad, indeterminate fascia beneath the testaceous stigma ; radix and tegulae whitish, the latter sometimes rufescent, areolet with the outer nervure obsolete ; nervellus antefurcal. Length, 4–7 mm.

Gravenhorst gives two varieties ; one with pronotum alone red, the other having the abdomen ferrugineous with the two basal segments stramineous-margined. Brischke adds a ♂ with head, thorax and abdomen black and the scape ferrugineous beneath.

This differs from all our other indigenous species in having the scape sub-cylindrical and not excised ; the flagellum long, slender and nearly filiform ; the vertex narrow and mesonotum dull, the fenestrae small and confluent ; the petiolar area impressed, shining and not discreted, the terebra shorter than the basal segment, the epipleurae of the second and third segments wanting, with their spiracles far from the lateral margin. The indeterminately piceous legs and abdomen, and clouded wings render its facies sufficiently distinct.

On the Continent it is common upon plants infested with *Aphides* and *Syrphid* larvae; it is recorded by various authors as bred from *Tinea biselliella*, *T. crinella*, *Coleophora nigricella*, *Chrysocorys festaliella*, *Pieris brassicae* and *Acronycta psi*. It is by no means uncommon with us, and is usually found on house-windows in June and July. Common in Norfolk (Bridgman); Stonehouse in Devon (Bignell); Hastings district (List); Maldon in Essex (Fitch); I possess specimens from Capron's and Piffard's collections, found in June; Miss Chawner has taken it in the New Forest and Elliott at Peterborough, early in July. It has occurred to me on windows at Butley, and Monks' Soham House, in Suffolk. The type form was bred hyperparasitically from *Cucullia argentea* by Brischke, who raised his male variety from larvae of *Ocneria dispar* through a species of *Microgaster*, and from *Harpyia bifida* through a *Paniscus* cocoon.

16. *pictipes*, Grav.

Hemiteles pictipes, Gr. I. E. ii. 799; Tasch. Zeits. Ges. Nat. 1865, p. 131, ♀; Thoms. O. E. x. 972; Schm. Term. Füz. 1897, p. 513, ♂ ♀.

Head with the palpi, labrum and mandibles centrally, white; vertex somewhat broad and not contracted behind the eyes, cheeks buccate; clypeus discreted, short and apically truncate with two small central teeth; mandibles not tuberculate; face of ♂ with white pubescence. Antennae slender, shorter than the body, with the second flagellar joint not shorter than the first; of ♂ elongate and a little attenuate with the scape white beneath, of ♀ filiform with the scape testaceous beneath. Thorax sub-cylindrical; mesonotum densely and very finely pubescent and dull, with the notauli obsolete; metathorax somewhat smooth, with complete areae and fine costae; areola almost pentagonal, basally sub-acuminate and apically truncate; petiolar area discreted, apophyses wanting. Abdomen stout, sub-fusiform, of ♀ apically compressed and as broad as the thorax; black, ♀ with the second segment, ♂ with most of the incisures, castaneous; basal segment basally bicarinate and closely punctate, apically finely aciculate, gradually explanate throughout; post-petiole very broad, sub-quadrate, strongly convex, twice broader and slightly longer than the basally contracted petiole; terebra as long as the abdomen, black, with the very stout and lanceolate and apically truncate spicula, and the sub-exserted ♂ valvulae, red. Legs normal, pale red; anterior coxae whitish, intermediate sometimes red, both pairs often basally black, as are the hind coxae; all the trochanters entirely white; hind tarsi and part of their tibiae infusate, the latter being basally white. Wings hardly clouded; stigma infusate, and emitting the apically straight radial nervure from beyond its centre; tegulae, radix and base of stigma white; areolet externally obsolete; nervellus evidently antefurcal. Length, 5-6 mm.

It differs from all the subsequent females in its broader and more convex basal segment, and in its longer and lanceolate terebra. It is similar to *H. varicoxis* in the white basal hind tibial band, by which it is distinguished from *Cecidonomus inimicus*. The latter shares in common with it the dull frons and mesonotum, complete metathoracic areae, broad and finely striolate post-petiole, etc.

It is said to occur in June, and has been found by Bridgman at Earlam, near Norwich, in July. I possess three males and one female of

this species from Dr. Capron's collection, probably taken at Shere in Surrey; the female has the abdomen somewhat broadly red in the centre.

17. *varicoxis*, *Tasch.*

Hemiteles coactus, Ratz. Ichn. d. Forst. iii. 155, ♀; Brisch. Schr. Nat. Ges. Danz. 1881, p. 348, ♂ ♀ (?). *H. varicoxis*, Tasch. Zeits. Ges. Nat. 1865, p. 134; Thoms. O. E. x. 972; Schm. Term. Füz. 1897, p. 513, ♀.

Head black with the palpi and base of the cheeks white; face aciculate, clypeus smoother but not discreted. Antennae filiform and apically acuminate, with the joints elongate. Thorax black; metathorax smooth, with complete areae; areola hexagonal and basally contracted; petiolar area nearly vertical, discreted and sub-alutaceous; apophyses distinct. Abdomen castaneous, with the broad, curved and apically slightly explanate basal segment black and the anus white; post-petiole deplanate and, like the second segment, finely rugose longitudinally, with the spiracles sub-obsolete and the apex glabrous; third segment except at its apex coarsely punctate. Legs with the front tibiae intumescent; anterior femora and tibiae castaneous with darker tarsi; apices of the hind femora and their tarsi black, their tibiae piceous and basally white; trochanters and the anterior coxae white. Wings slightly clouded below the large and piceous stigma; radix, tegulae and base of the stigma white. Length, 4-7 mm.

This species is related to *H. castaneus*, Tasch., in its dull and densely pubescent frons and mesonotum, complete metathoracic areae, evidently antefurcal nervellus, elongate terebra, finely alutaceous second and striolate first segments, but may be distinguished by the colour of the legs and by the more obviously sub-rugose-punctate and red central segments.

"Das ♂ stimmt in Grösse, Körperform, Skulptur und Färbung ganz genau mit dem ♀; die Skulptur der 3 ersten Segmente ist etwas gröber. Fühler schwarz, Schaft unten mit weissem Fleck. Die 2 letzten Segmente schwarz-braun. Vorderhüften mehr rot als weiss. Hinterhüften schwarz-braun und rot. Hinterschenkel und Schienen ganz rot, letztere ohne weissliche Basis."—(Strobl. 1900).

This species has only been found in Sweden and Germany, where Ratzeburg bred his very probably synonymous *H. coactus* from *Andricus terminalis* together with his *H. punctatus* (? *Cecidonomus Westoni*) and *Phygadeuon hortulanus*, Grav. *Biorrhiza terminalis* is an oak-feeder, and Schmiedeknecht says he has always taken *H. varicoxis* on coppice-oaks. It has long stood in our catalogue, but I only know of Bridgman's record of it from Earham, near Norwich, in July.

18. *castaneus*, *Tasch.*

Hemiteles palpator, var. 3, Gr. I. E. ii. 821, ♀. *H. castaneus*, Tasch. Zeits. Ges. Nat. 1865, p. 132; Brisch. Schr. Nat. Ges. Danz. 1881, p. 347, ♀; Bridg. Trans. Ent. Soc. 1882, p. 143, ♂; Thoms. O. E. x. 971, excl. ♂.

Head with the palpi and centre of the mandibles flavous in ♂, usually ferrugineous in ♀; clypeus discreted, half the breadth of the face; frons dull and finely pubescent; ♂ face clothed with white pubescence. Antennae somewhat stout, with flagellar joints apically incrassate; of ♀

basally deep red, with the first or first two joints fulvous beneath; scape of the ♂ flavous beneath. Mesonotum densely and very finely pubescent; metathorax closely and somewhat confluent punctate, areola distinct, petiolar area discreted. Abdomen black; of ♀ with the closely punctate segments two to four entirely, the apex of the first and sometimes the margin of the fifth and sixth, castaneous; of ♂ with the third segment basally rufescent; basal segment broad, deplanate, laterally curved, of ♀ closely and somewhat confluent punctate and aciculate, of ♂ nearly smooth; second segment very finely and evenly punctulate, of ♂ quadrate, with very small thyridii; the following transverse with the apical, and sometimes the penultimate, white-marked; terebra longer than half the abdomen. Legs deep red; of ♀ with the hind tarsi and apices of their tibiae nigrescent; of ♂ with trochanters except part of the hind ones, front and apices of the intermediate coxae, flavous with the hind coxae part of their trochanters and apices of their tarsi, black. Wings somewhat discally clouded, but not fasciated; tegulae fulvescent, nervellus distinctly antefurcal. Length, 4-6 mm.

The female is closely allied to that of *C. inimicus* in its dull frons and mesonotum, entire metathoracic areae, elongate terebra, the abdominal sculpture, etc., but the antennae are brown, becoming testaceous basally, the legs are stouter, the post-petiole broader and the metapleurae punctulate. I consider it greatly more probable that Bridgman's male is the true one of this species, since two examples were bred, together with one female, from the cocoons of *Trichiosoma betuleti*, by Bignell in South Devon, on 13th April, 1882; that described by Thomson was, I have little doubt, associated entirely on account of structural affinities.

This species has only been noticed on the Continent in Sweden and Germany, where it was bred by Brischke from *Clavellaria amerinae*, *Lophyrus pini* (or *L. similis*), and from a species of *Chrysopa*. In Britain it has been bred by Sang from *Exaeretia Allisella* (Entom. 1881, p. 139), and has been recorded from the Hastings district, Earldham near Norwich, Bickleigh, in Devon, and Armagh (Irish Nat. 1904, p. 256). I possess specimens taken by Butler at Abinger Hammer, Capron about Shere, Piffard at Felden, and by myself at Lyndhurst in the New Forest early in August.

In one of the four cocoons of *Zygaena filipendulae*, containing larvae of *Mesostenus obnoxius* (q.v. post), sent me by Prideaux, from Reigate in February, 1901, was a hyperparasite's cocoon. The *Mesostenus* cocoon was quite perfect and contained its larva, which had evidently not been long dead, since it was quite soft and only beginning to turn black, but the whole surface had become very finely and distinctly transaciculate through shrinkage; on its skin were two or three membraneous bodies, probably drawn from its interior organs with the emergence of the parasitic larva, as well as a few black spots. No trace of further parasites was found upon opening the dead larva, which was less than half consumed. Within the *Mesostenus* cocoon, affixed to one side of it and occupying rather less than half its lateral area, was the cocoon of the hyperparasite, composed of white strands where it was affixed, though centrally translucent and showing the yellow colour of the larva within it. It is of the consistency of gold-beater's skin, ovate-cylindrical, much depressed and composed of three or four unconnected layers.

The hyperparasitic larva consists of thirteen dorsal and fourteen ventral segments, including the head and anus. Like that of the *Mesostenus*, it is primrose-yellow throughout and its lateral border is equally explanate, the segments being obliquely impressed at the longitudinal fold. The central dorsal line (alimentary canal) is noticeably darker on the third to the ninth segments. The second segment appears to have a minute prominence on either side in front, and the third to the eighth are furnished with somewhat arcuately placed pseudo-feet. The usual sub-cutaneous granules are visible, though less distinct than in *Mesostenus* (they probably vary in distinctness at different periods of life). The larva's head is marked as shown in the figure, and the larva which is strongly deplanate, both dorsally and ventrally, is shaped as in figure 2.



Castaneus.

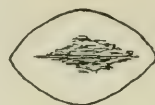


fig 2.

I saw no more of this insect after replacing it in its cocoon till the morning of 30th April following, when I found it had emerged as a female *Hemiteles castaneus*. It was a most active creature, incessantly vibrating its antennae and poking them into every chink of its prison; to such an extent did it appear to rely upon the sense of touch that one might suppose its sight defective if it did not at once retreat upon an approach being made. When motionless on a level surface the antennae are deflected and held wide apart, with their apices just touching the ground; when on a perpendicular surface they are laid back and held close together over the thorax.

19. pedestris, Fab.

Ichneumon pedestris, Fab. E. S. ii. 344. *Pezomachus pedestris*, Gr. I. E. ii. 882; Ratz. Ichn. d. Forst. i. 154; iii. 149, ♀. *Theroscopus pedestris*, Först. Wieg. Arch. 1850, p. 102, ♀. *Hemiteles pedestris*, Thoms. O. E. x. 993, ♂ ♀. *H. monozonius*, Gr. I. E. ii. 802, cf. i. Suppl. 712; Ratz. Ichn. d. Forst. 152; Tasch. Zeits. Ges. Nat. 1865, p. 133, ♂. Var. *H. micator*, Gr. I. E. ii. 832, excl. ♀. (?) *H. castaneus*, Thoms. O. E. x. 971, excl. ♀. *Pezomachus vagans*, Rosenh. Bericht Naturf. Nürnberg. 1845, p. 179; cf. Ann. Soc. Fr. 1869, pl. i. fig. 15, ♀.

♂. Head black with the palpi infusate; mandibles sparsely punctate with the lower tooth somewhat the shorter; clypeus indistinctly discreted, apically reflexed, with a single central sub-acuminate tooth; face and frons deplanate and coriaceous; vertex evenly convex and dull. Antennae slightly shorter than the body, setaceous, pilose; black with the base of the cylindrical first flagellar joint alone red. Thorax black and dull, strongly convex and somewhat short; pronotum with no carinae; mesonotum dull, closely and evenly coriaceous, anteriorly elevated with the notauli wanting; metathorax evenly scabrous and convex, with the discal costae entirely obsolete and apophyses wanting. Scutellum coriaceous and somewhat convex. Abdomen elongate-ovate, shortly pilose, black, with the incisures of the first two or three segments castaneous; basal

segment elongate, linear, with the post-petiole hardly broader, basally carinate and laterally narrowly bordered throughout, with the spiracles sometimes prominent; three basal segments closely, finely and evenly coriaceous and dull, the following nitidulous. Legs red, with coxae, base of the posterior trochanters, hind femora and all the tarsi, piceous. Wings ample and evenly though very slightly clouded; nervures and the broad stigma piceous, base of the latter and tegulae and radix flavous; fenestrae broadly separated, nervellus very strongly antefurcal. Length, $3\frac{1}{2}$ –5 mm.

The four basal antennal joints are said to be sometimes red.

I possess a micropterous specimen belonging certainly to this species, since the outline, sculpture and abdominal coloration are identical, though the basal third of the antennae, the coxae, trochanters and femora are entirely testaceous, and the thorax obsoletely castaneous-marked. The wings are extremely small and the scutellum proportionately weakly developed.

I only know the ♂ of this species, which may conceivably be Gravenhorst's *H. limbatus*, but if so, the descriptions of the latter are utterly inadequate, and the present insect differs very widely in sculpture from that which I understand as *H. limbatus*. It bears a superficial resemblance in its convex thorax and sub-ovate abdomen to *H. aestivalis*, but the antefurcal nervellus and linear petiole are very distinct. The dentate clypeus and exareolated metathorax will distinguish it from any described species.

The variety *micator* is more slender, with the palpi, whole of second, and part of the third segment, stramineous. It is very possible that both this and the type form should prove to be the ♂ of some cognate *Pezomachus*, to which relationship the metathoracic structure points, but till the sexes be associated it is fitter to retain it in *Hemiteles*.

Gravenhorst captured it on shrubs in August, and says that Hope took, at Netley in Shropshire, a specimen with antennae entirely, the hind coxae and apices of their tibiae, black, which he considered a variety of this species. It has been bred on the Continent, where it is found only in Germany, by Hartig, from *Perilitis unicolor* (cf. Kirch. Cat. 66). In Britain there are no recent records; it first occurred to me in the Bentley Woods near Ipswich, on 10th April, 1895; I subsequently found it hibernating in a tuft of grass in St. Helen's Wood at Hastings, in March, at Monk Park Wood in Suffolk and at Gosfield in Essex, in May. Piffard has found it at Felden in Herts., and it is probably not uncommon in Britain. The above-described micropterous specimen was bred by E. R. Banks in July, 1901, hyperparasitically through a species of *Limneria*, from *Acrolepia granitella*, Tr., at Corfe Castle in Dorsetshire.

Since writing the above I have identified the brachypterous ♂ with that of *Hemiteles* (*Theroscopus*) *pedestris* as described by Thomson, and am now in a position to associate the sexes.

♀. Head black with the palpi fulvous and mandibles dark red, apically piceous; face rugose above; clypeus and the prominent epistoma smooth; clypeal foveae with an external rugose area; head smooth with diffuse and somewhat coarse puncturation. Antennae piceous with the five or seven basal joints red; two basal flagellar joints of equal length. Thorax entirely black with coarse puncturation and long pubescence; petiolar area rugose with no basal costa; apophyses acuminate; costae wanting,

with only the area spiraculifera indistinct. Abdomen very diffusely and finely punctate and pubescent, black with the second and third segments red, sixth and seventh whitish; basal segment not longer than the terebra, its spiracles obsolete; petiole normally, with the aciculate and punctate post-petiole strongly, explanate, its apex broad. Legs red with the apex of the hind femora, base and apex of their tibiae, piceous. Wings hardly reaching beyond base of metathorax, extremely short and narrow. Length, 5 mm.

The female is by no means uncommon with us; Piffard has taken both sexes at Felden in Herts.; Elliott has swept the female from reeds in Barnby Broad, in August; Capron found it in Surrey; Donisthorpe has sent it me from Kerry in Ireland; and I have captured it beneath *Ononis* on the shore at Southwold in Suffolk, in July. Butler has found the brachypterous male at Abinger Hammer in Surrey; Chitty at Huntingfield in Kent, in October; and Chapman has sent me a female bred at Locarno from a black earthen cocoon in which I found a dead *Acarus*, upon which it is extremely probable that it had subsisted.

20. *subzonatus*, Grav.

Ichneumon subzonatus, Gr. Mon. Ped. 40; *Pezomachus subzonatus*, Gr. I. E. ii. 887; *Therospilus subzonatus*, Först. Wieg. Arch. 1850, p. 101, ♀. *Hemiteles crassicornis*, Gr. I. E. ii. 847; Tasch. Zeits. Ges. Nat. 1865, p. 123; Schm. Term. Füz. 1897, p. 517, ♀.

♀. Head black, hardly narrowed posteriorly, with the mouth red; vertex convex, nitidulous and sub-glabrous. Antennae filiform, rather longer than half the body, with the three basal joints usually red; flagellum very stout with eighteen joints, of which the basal ones are distinctly discreted, the second being longer than the first. Thorax stout, sub-cylindrical; mesonotum nitidulous and centrally sub-aciculate; metathorax finely alutaceous with the costulae and apophyses entire; areola hexagonal and not longer than broad; petiolar area not discreted. Abdomen ovate, petiolate; infusate with the three first segments indeterminately red or luteous; basal segment usually piceous, obsoletely aciculate, with the petiole linear, rather narrower and twice longer than the narrow, bordered and slightly explanate post-petiole; spiracles obsolete; following segments glabrous and strongly nitidulous; terebra one-third the length of the abdomen. Legs not slender, entirely pale fulvous, with only the apical tarsal joint infusate. Wings normal, hardly clouded; stigma and costa piceous, the former obsoletely paler basally; radix and tegulae white; areolet pentagonal and incomplete, nervellus distinctly antefurcal. Length, 3 mm.

♂. So similar to the female that it is strange it has hitherto been overlooked. The head is identical in every way; the antennae are nearly the length of the body and much less incrassate, though the flagellum still bears eighteen joints, of which the second is slightly longer than the basally pale first joint; mesonotum basally scabriculous and sub-deplanate; abdomen elongate and broadest behind the middle, with the basal segment sub-linear and less explanate apically; posterior coxae and base of the trochanters black. Otherwise it exactly corresponds with the female. The male type is in my collection.

I have noticed four varieties of this species, to which Förster would doubtless have accorded specific rank: (1) Flagellum of ♂ with nineteen, of ♀ with seventeen, much less distinctly discreted joints, of which the two basal are sub-equal in length; mesonotum nitidulous throughout and not deplanate; post-petiole more strongly aciculate with prominent spiracles; posterior coxae and often the hind femora black; and, above all, the nervellus intercepted only just below the centre. (2) Flagellum of both sexes with nineteen joints, of which the second is distinctly shorter than the first, and the following three or four moniliform and red; mesonotum nitidulous and convex throughout; post-petiole somewhat strongly aciculate, but with no conspicuous spiracles; hind legs with the coxae basally and femora centrally piceous; and, above all, the nervellus opposite and not intercepted. (3) Antennae rather longer than the body; flagellum conformed as in the type-form, but bearing twenty joints, of which the second is rather shorter than the first; head and mesothorax dull and coriaceous; post-petiole densely and evenly aciculate throughout; remainder as in the type. (4) Agreeing in every particular with the type-form, excepting only that the wings are only visible under a high-power lens with a consequential modification of the whole metathorax and scutellum, which latter is reduced to half its normal size; beyond this I was surprised to find the eyes, which normally occupy the whole side of the head, greatly reduced in size and of greater convexity, leaving a broad space before the occiput. This is the form first described by Gravenhorst.

This differs from all our other species described by Gravenhorst in its distinctly incrassate antennae and exactly ovate abdomen, the colour of which latter appears to be subcutaneous and is, consequently, extremely variable, the whole abdomen being sometimes pale, and at others piceous with only the second segment basally pale. It also rarely has the metathorax more or less badius.

It is doubtless very common, though I find but two records, and it has not yet been bred: taken in Devon, probably at Alphington (Parfitt); Maldon in Essex (Fitch). The typical females Tuck has sent me from Bungay in October, and from Tostock and Finborough Park in Suffolk in September; Bignell from Cann Wood in Devon in July, and Exeter in August; Piffard has taken it at Felden in Herts.; and Capron commonly in Surrey. I have noticed that when alarmed it feigns death by curling up its legs and wings and remaining motionless for some moments. It has occurred to me on the flowers of *Angelica sylvestris* at Claydon in September, by sweeping in a marshy wood at Bramford and on nettles at Ipswich in October, in a bag of pine needles from Wherstead in February, but it is commonest in April upon thick *Coniferae* at Bentley Woods and Foxhall, and I once found it in an Ipswich sand pit early in May, and once on *Angelica* flowers at Matley Bog in the New Forest, in August.

The typical males have been found by Bignell at Bickleigh in June, August and September; by Marshall at Cornworthy and Bishopsteigton in Devon; and on *Daucus carota* flowers at Westleton; *Angelica* flowers in an Ipswich garden; on reeds at Covehithe Broad and flying upon Southwold beach in July (all in Suffolk), by myself. On the Continent it appears but little known, and that only in Hungary and Germany. Of my first variety I possess females from Brandon, beneath bark of a felled log full of *Laemophloeus ferrugineus* and *Typhaea fumata* at Wherstead in May, and from Wicken in June; Butler has sent it me from Abinger

Hammer, and Marshall (the only ♂ I have seen) from Cornworthy, near Totnes. The second variety is represented in my collection by a female taken by Capron, probably at Shere, and a male by Marshall at Govilon, near Abergavenny. Of the third variety I have but a single female, also from among Marshall's unnamed specimens, from Botusfleming in Cornwall. The micropterous form (*Pez. subzonatus*) has not before been associated with *H. crassicornis*, and only four examples have come under my observation; one captured by Willoughby Ellis in Sherwood Forest and another by E. A. Butler at Wymondley in Hertfordshire; Piffard has found one at Felden in Herts. and in the middle of September, 1898, I took it in a crag pit at Foxhall, near Ipswich.

21. *contaminatus*, Grav.

Hemiteles contaminatus, Gr. I. E. ii. 840; Schm. Term. Füz. 1897, p. 516, ♀.

Head with mouth stramineous. Antennae slender, filiform and rather shorter than body, with the joints cylindrical and not discreted; infusate, basally testaceous and centrally broadly white-banded. Thorax sub-cylindrical. Abdomen fusiform, distinctly petiolate, slightly narrower than the thorax and apically truncately compressed; black with margin of first two segments rufescent and of the last stramineous; basal segments bottle-shaped, with post-petiole as long as petiole and twice longer than broad; terebra hardly length of half abdomen and obliquely reflexed. Legs slender, entirely pale flavidous. Wings ample and hardly clouded; stigma dark testaceous, tegulae red, radix pale stramineous. Length, 4 mm.

We here have a good example of the value of Taschenberg's revision; he makes no mention of the present species, which consequently no one has recognized from Gravenhorst's description, translated above. The original single female transmitted to Gravenhorst from Piedmont still remains unique, excepting, of course, for the supposititious British specimen or specimens brought forward by Marshall in his 1870 Catalogus and repeated in 1872.

22. *incisus*, Bridg.

Hemiteles incisus, Bridg. Trans. Ent. Soc. 1883, p. 150, ♀; Thoms. O. E. x. 987, ♂♀.

Head somewhat nitidulous, of ♂ dilated behind the eyes; frons finely and somewhat sparsely punctate, transverse; face slightly narrower above than below; mandibles not tuberculate, of ♂ black. Antennae of ♂ black, of ♀ rather longer than half body, filiform, with scape red; two basal flagellar joints red, of equal length and four times longer than broad, following becoming shorter. Thorax as broad as head and slightly longer than high; mesonotum dull and pubescent, centrally scabriculous anteriorly and aciculate posteriorly; notauli distinct but not deeply impressed, extending to centre, with lateral lobes nitidulous and distinctly though not very closely punctate; metathorax nitidulous and rugose with the transverse costae prominent, but the longitudinal indistinct; areola irregularly hexagonal, twice broader basally; petiolar area entire, apophyses sub-acute. Scutellum smooth and shining, sparsely punctate. Abdomen smooth and shining with scanty pubescence; the segments transverse with very distinct incisures, the second to fourth and apex of the first brunneous; basal

segment distinctly and usually the basal half of the second finely aciculate, the former explanate and twice longer than apically broad ; terebra about half the length of the abdomen. Legs stout, red ; tarsal claws somewhat stout ; ♂ with the coxae and trochanters black. Wings with the stigma piceous and apically white ; radix and base of costa pale ; areolet pentagonal with the outer nervure wanting, nervellus antefurcal ; of ♀ usually with an infusate fascia traversing the disc beneath the stigma. Length, 3-5 mm.

This distinct species is said to be similar in colour and size to *H. floricolor*, but the sculpture of the head and mesonotum, the ♀ fasciated wings and ♂ dilated occiput will readily distinguish it. I possess, however, females in which the wings are hardly at all fasciated, though the metathoracic and petiolar sculpture is identical.

The original female was taken by Billups at Chobham. Bred from *Laverna epilobiella* and captured at Earham and Heigham, near Norwich, in July and September (Bridgman). Recently it has turned up in Sweden and Germany. It has occurred to me at Finborough Park in Suffolk in mid-September ; Capron found it at Shere in Surrey ; Bignell at Chichester and Bickleigh, in July and August ; and Beaumont at Lewisham, in May.

23. *brunneus*, sp. n.

Head black, transverse, distinctly narrowed behind the eyes, very closely and finely punctate, and dull, with the vertex sub-convex and finely pubescent. Antennae piceous, ferrugineous beneath ; flagellum filiform, sub-incrassate apically and consisting of nineteen, twenty or twenty-one joints ; basal joints decreasing in length, scape sub-cylindrical. Thorax somewhat short, black ; pronotum not carinate ; mesonotum obsoletely punctate, nitidulous and anteriorly vertical, with the notauli small and not deeply impressed ; metathorax shining, with distinct and strong costae ; areola entire, emitting the costulae from its centre, of ♀ sub-transverse and basally rounded, of ♂ sub-quadrate and basally contracted ; petiolar area discreted, apophyses small but acute. Abdomen sub-glabrous, piceous, with two or three basal segments brunneous, of ♀ elongate-ovate, of ♂ sub-cylindrical ; basal segment sub-glabrous, of ♀ with the post-petiole bordered, of ♂ sparsely punctate and distinctly bicarinate ; terebra three-quarters the length of the abdomen. Legs entirely testaceous, with only the apices of the tarsi piceous. Wings hyaline, with the areolet apically incomplete and sub-transverse ; fenestrae broad and very nearly confluent, discoidal cell apically acute ; nervellus slightly antefurcal, intercepted far below the centre. Length, 3-3½ mm. ♂ ♀.

This species is closely allied to *H. incisus*, Bridg., but differs very materially in the structure of the mesonotum, metathorax and basal abdominal segments.

I expect it to be not uncommon, though probably mixed with the preceding. A male occurred to me on flowers of *Angelica sylvestris* at Claydon bridge near Ipswich, in August, 1899, and subsequently a female on the window of a house in Southwold, in the middle of September. Tuck has found it at Tostock early in September, and Bignell at Bickleigh, in June and August.

24. *limbatus*, Grav.

Hemiteles limbatus, Gr. I. E. ii. 803; Tasch. Zeits. Ges. Nat. 1865, p. 126; Schm. Term. Füz. 1897, p. 517, ♂.

♂. Head black, with the clypeus discreted and somewhat angularly prominent apically. Antennae setaceous and longer than half the body. Thorax black; metathorax rugose, centrally longitudinally wrinkled with the costulae indistinct; petiolar area laterally curved and basally sub-acuminate. Abdomen oblong-ovate and narrower than the thorax; the three first segments closely punctate apically and laterally, and the following apically, red; the basal segment obsoletely tuberculate, apically gradually dilated, laterally immaculate, with the post-petiole rather longer than broad and obsoletely aciculate. Legs normal, red; trochanters except apices of the hind ones, and all the coxae, black; anterior femora externally black-marked. Wings normal, hardly clouded; stigma black, tegulae dull ferrugineous; radix flavescent, areolet wanting. Length, 4-6 mm.

The conformation of the clypeus, which seems to relate it with *C. inimicus*, and of the petiolar area are hardly sufficient to distinguish this species. There is, however, a male in my collection which agrees with no other known species, but possesses all the points enumerated above. To them I would add that the head is buccate and entirely black, with only the apices of the mandibles dull red, their teeth being sub-equal; clypeus convex, apically mutic and punctate, and distinctly discreted; face and vertex shortly pubescent and obsoletely punctate, with deeply impressed genal sulcus and sub-prominent epistoma. The second flagellar joint is not shorter than the first. Mesonotum obsoletely pubescent and punctulate, nitidulous with the notauli elongate, sub-coalesced discally but not deeply impressed; basal area broad, areola exactly hexagonal, truncate at base and apex, emitting the obsolete costulae from its centre; petiolar area somewhat narrow, scabrous with no apophyses. Basal segment scabrous throughout and hardly curved, with distinct tubercles, before which it is bicarinate; post-petiole not narrow, parallel-sided, obsoletely aciculate and distinctly margined; second segment closely and evenly coriaceous, apically glabrous and sub-callose, with the thyridii sub-transverse. Hind femora, apices of their tibiae and all the tarsi piceous.

♀. Agreeing in every way with the above ♂, excepting in the conformation of the basal segment and the coloration of the legs; the metathorax is identical in every particular, but the antennae are centrally sub-incrassate and ferrugineous. The basal segment is apically broad, gradually explanate throughout with the basal carinae inconspicuous; the post-petiole is sub-convex and evenly coriaceous, with very slight traces of aciculation, but distinctly margined laterally. Legs entirely fulvous with only the hind coxae black. Terebra three-quarters the length of the abdomen. Length, $3\frac{3}{4}$ mm.

Both sexes strongly resemble *H. crassicornis* in outline, but the costulae are obsolete and the areola a little longer than broad. The ♂ has the post-petiole much broader, and in the ♀, which is now for the first time described, the abdominal coloration is definite, with the antennae more slender.

The above male and female were standing under this name in a collection kindly given me by Mr. Alfred Piffard, and were captured by him at Felden in Hertfordshire; Wilson Saunders also took it, probably at Greenings in Surrey. It is said to have been bred by Brischke from the cocoon of a species of *Chrysopa* in Germany, where alone it has been noticed on the Continent.

25. *floricolorator*, Grav.

Hemiteles floricolorator, Gr. I. E. ii. 841, ♀ (? ♂); Tasch. Zeits. Ges. Nat. 1865, p. 132, ♀; Thoms. O. E. x. 981, ♂ ♀. *Microgaster perlae*, Doumerc, Bull. Soc. Fr. 1855, p. 81; cf. Sichel, *lib. cit.* p. 88 et 1857, p. 96.

Head black, with the mandibles generally castaneous; epistoma not prominent; clypeus short and discreted. Antennae slender, filiform, shorter than the body; of ♂ black, of ♀ with the flagellar joints discreted, ferrugineous with the scape concolorous beneath. Thorax black, epomia wanting. Metathorax finely alutaceous, with distinct apophyses and complete upper areae; lateral costae wanting or, like the spiracles, subcontiguous with the pleural; areola subpentagonal. Abdomen oblong, as broad as the thorax; black, of ♂ with the second and third segments apically, of ♀ with the second and third segments entirely, generally also apex of the first, base of the fourth and the sides of the fifth, red; basal segment stout, carinate, twice longer than broad, gradually dilated apically, and more or less distinctly canaliculate; tubercles wanting, post-petiole closely punctate; segments two to four very finely punctate with apical margin subcallose and nitidulous; terebra nearly length of abdomen. Legs rather pale red, with femora and tibiae stout, and hind tarsi sometimes infuscate. Wings hyaline and somewhat ample; stigma and tegulae stramineous or piceous, radix pale; areolet pentagonal with outer nervure obsolete. Length, 3-5½ mm.

Thomson says the stout legs, inflated front tibiae and entirely or partly red second and third segments of the ♀, and the black abdomen with the second and third segments only apically red of the ♂, will distinguish this species, which is most closely allied to *H. melanogaster*.

It occurs in Sweden and Germany and is probably quite common with us. W. H. B. Fletcher has bred both sexes from old birds' nests—perhaps from *Tinea rusticella*—at Bognor, together with *Phygadeuon rusticellae* (Trans. Ent. Soc. 1886, p. 338); and Bridgman adds that the female varies much in colour, one having the abdomen almost entirely black, with only the two basal segments apically rufescent. It is said to occur in June and has been taken at Maldon in Essex (Fitch), Shere in Surrey (Capron), Ireland (Beaumont), Earlham and Lakenham in Norfolk (Bridgman), and bred from *Depressaria nervosella*, on 20th August, in Devon (Bignell). I swept a male at Matley Bog, in the New Forest, on 10th August, 1901.

26. *albomarginatus*, Bridg.

Hemiteles albomarginatus, Bridg. Trans. Ent. Soc. 1887, p. 363; Schm. Term. Füz. 1897, p. 519, ♀.

A shining black species with the legs mainly red and anus broadly white. Head transverse, subglabrous and slightly pubescent, broader

than the thorax and strongly contracted behind the eyes. Antennae slender, about as long as the body, sub-filiform but attenuate towards both base and apex; the second and third flagellar joints sub-equal and nearly four times longer than broad. Thorax slightly longer than high; mesonotum somewhat sparsely punctate, especially laterally, with the notauli distinct; metathoracic areae entire, costae prominent and coarsely rugulose; areola pentagonal, hardly longer than broad. Scutellum gibbose and sparsely punctate. Abdomen elongate-ovate, with the second incisure sub-rufescent and segments five to seven distinctly white apically; post-petiole roughly punctate, explanate and about one-fourth longer than the breadth of the glabrous apex; spiracles not prominent; following segments transverse, the second and third centrally impressed and rugosely punctate discally; terebra two-thirds the length of the abdomen. Legs slender, red; coxae, base of trochanters and of the posterior femora, nigrescent; tarsi apically infusate. Wings slightly clouded, tegulae and radix white; stigma infusate, basally pale; areolet pentagonal and incomplete; nervelet distinct; nervellus antefurcal. Length, nearly 5 mm.

This unique female was found by G. C. Champion at Box Hill in Surrey, and is probably in the Bridgman Collection in the Norwich Castle Museum.

27. *niger*, *Tasch*.

Hemiteles niger, *Tasch*. *Zeits. Ges. Nat.* 1865, p. 136, ♂ ♀.

A stout black species. Head coarsely punctate, with piceous pubescence, black with the mouth red; clypeus discreted, short and a little narrower than the face. Antennae shorter than the body, black, filiform, with the joints not discreted and the scape red beneath; of ♀ with a central band white. Thorax black; mesonotum coarsely and sparsely punctate with the notauli strong and basally coalesced; metathorax strongly rugose, especially in the ♂; areae complete, areola elongate and narrow, of ♂ pentagonal and apically truncate with the basal area lanceolate; petiolar area discreted. Abdomen elongate, basally dull and broadest behind the middle; basal segment gradually explanate, hardly angular behind the spiracles, which are not prominent; basally bicarinate with the post-petiole margined; the three basal segments distinctly and coarsely striolate longitudinally, the following finely punctate and densely pubescent. Legs red; tarsi and ♂ coxae and femora black. Wings with the radix testaceous; tegulae and stigma black; fenestrae broadly separated and the nervellus distinctly antefurcal. Length, 5-6 mm.

The coarse sculpture and black abdomen, combined with the striate second and base of the third segments will at once distinguish this species, whose facies is much more that of a *Phygadeuon*, to which genus it probably more properly appertains, since the outer nervure of the areolet is traceable though pellucid.

Taschenberg first bred it from a ligneous fungus, wherein, I surmise, it may have been parasitic upon *Orchesia micans* larvae. I found a male of this species hibernating in moss in the Bentley Woods near Ipswich, on 23rd March, 1895. This is a most remarkable incident, and I can recall no other instance of hibernation among male Ichneumonidae, excepting my above record of *Hemiteles pedestris*, Fab. On 4th April, 1896, I swept

another example of the same sex at Foxhall in Suffolk ; Piffard has also taken it at Felden in Hertfordshire ; and Thornley at Leverton in Nottinghamshire, on 10th April.

28. *melanogaster*, Thoms.

Hemiteles melanogaster, Thoms. O. E. x. 982 ; Schm. Term. Füz. 1897, p. 523, ♂ ♀.

Black, with legs except base of coxae red, metathorax punctulate, metapleuræ scabrous ; ♂ with the legs black with the apices of the trochanters, the anterior knees and tibiae testaceous, the hind tibiae being nigrescent at base and apex. Length, 3-4 mm.

Closely allied to *H. floricator*, Grav., in its hyaline wings, absent epomiae, the lateral metathoracic costae wanting or lying close to the pleural, with which the spiracles are nearly contiguous, the very finely punctate central segments which bear sub-callose and nitidulous apical margins and in the short radial appendix, but differing therefrom in the metathoracic sculpture, black and dully sub-rugose abdomen and bicarinate post-petiole.

Bridgman devotes two lines in the middle of a paragraph (Trans. Norf. Soc. 1890, p. 64) to the record of both sexes of this new British species ; really, if insects new to the British fauna be recorded, it is only fair to the systematist that they should be brought prominently forward in other than a local society's journal. They were captured at Earlham near Norwich, in July, 1889. An allied species, *H. sisyphii*, Verh., has been bred from the egg-sacs of *Theridium sisyphium*, Clerck, in Germany.

29. *tristator*, Grav.

Hemiteles tristator, Gr. I. E. ii. 787, ♂ ; Tasch. Zeits. Ges. Nat. 1865, p. 126 ; Schm. Term. Füz. 1897, p. 523, ♂ ♀.

Black. Head with palpi and mandibles ferrugineous ; clypeus discreted and apically rounded. Antennae setiform, about length of body, with scape usually rufescent beneath. Metathorax transversely rugose ; areola broader than long ; apophyses sometimes acute. Abdomen oblong-ovate, as broad as thorax, with central segments parallel-sided and sub-deplanate ; basal segment sub-linear with post-petiole slightly longer than broad and a little broader and shorter than petiole ; second and third segments sometimes with incisures castaneous ; ♂ valvulae distinct. Legs somewhat slender ; the anterior red or stramineous with the coxae usually red with black base, and the hind ones red or testaceous with the coxae, whole or base of trochanters, centre or apices of femora, apices of tibiae and the tarsi, infusate or black ; ♀ with hind femora red. Wings sub-hyaline ; stigma infusate, radix and tegulae whitish ; areolet pentagonal, nearly always with outer nervure obsolete. Length, 3-5 mm.

Grävenhorst instances a ♂ variety, which is more slender, with all the femora entirely testaceous, but it doubtless has no connection here, since Taschenberg says its areolet is externally entire.

The present species resembles a *Phygadeuon* (*sensu lato*), but the basal segment is narrower and the areolet generally incomplete.

I possess this species from Capron's, Piffard's and Marshall's collections, the last taken at Botusfleming in Cornwall, and he also records it from

Yorkshire ; and I have captured it at Aldeburgh, in July, on house-windows at Great Bradley and Felixstowe, in June, and once attracted to artificial light, in which its wings were scorched, at Sudbury, in 1900. Bignell has captured it at Bickleigh in Devon, in September, and it is probably very common with us. On the Continent it is often found on house windows from June to August, as well as frequenting plants affected by *Aphides* and *Syrphid* larvae ; Taschenberg took eleven males on vine leaves in early August, and adds that the coloration of the legs is variable. It has been bred from *Pieris brassicae* and *Limneria* cocoons among the eggs of *Epeira diademata* (Brischke), *Fumea intermediella* and *Solenobia triquetrella* (Bridg.-Fitch). Waterston took both sexes in St. Kilda, in June, 1905.

30. *sordipes*, Grav.

Hemiteles sordipes, Gr. I. E. ii. 798 ; Tasch. Zeits. Ges. Nat. 1865, p. 131 ; Thoms. O. E. x, 976 ; Schm. Term. Füz. 1897, p. 521, ♀.

Head with vertex broad and cheeks buccate ; frons very finely and densely punctate and pubescent ; mandibles not geniculate. Antennae very slender and nearly length of body ; with scape excised and sub-globose. Mesonotum densely pubescent throughout, mesosternum not transverse ; metathoracic lateral costae wanting and the pleural nearly contiguous with the spiracles. Abdomen black, petiolate and as broad as thorax, with its anus sub-clavately compressed ; post-petiole sub-quadrate, slightly constricted basally, longer and twice broader than the petiole ; terebra as long as abdomen. Legs red, with coxae basally infusate ; femora and tibiae somewhat infusate above. Wings hyaline, with no trace of an areolet ; stigma piceous, radix and tegulae white ; nervellus antefurcal. Length, 4-5 mm.

Gravenhorst says this species is very like *H. similis*, but with body a little more slender, the terebra longer and basal segment broader ; but Taschenberg considered it so closely related to *H. pictipes* in form, sculpture and, except of the legs, colour as to be little more than a variety of that species. Thomson, on the other hand, places this species with *H. cynipinus* in a section apart ; he says the flagellum is very thin indeed, the segments are smooth and margined with olive colouring, epipleurae not inflexed, epicnemial slender, and areolet hardly entire externally, emitting the parallel nervure nearly from its centre.

I have quite failed to recognize this female, which occurs on the Continent in Germany and Sweden. The only definite record I can find, though it has for long stood in the British list, is Bridgman's, from Aylsham in Norfolk, where it was bred from the galls of *Cynips Kollari*.

31. *cynipinus*, Thoms.

Hemiteles cynipinus, Thoms. O. E. x. 977 ; Schm. Term. Füz. 1897, p. 524, ♂ ♀.

Black ; legs varied with red ; terebra shorter than the somewhat broad basal segment. Length, 3-4 mm.

So similar to the last-described species as to render details superfluous ; therefrom it differs in having the antennae less slender and shorter than the body, the flagellum filiform and slightly attenuate basally, the second segment more strongly transverse, the second to the seventh becoming

gradually shorter, finely and towards the apex more obsoletely punctate, the second to the fourth with the epipleurae acutely inflexed. The ♂ has the antennae rather shorter than the body, apically sub-attenuate, with the joints not discreted; its mandibles and legs black, the latter with the anterior knees and tibiae testaceous, the hind ones at the apex and a dot near the base infusate.

Professor Thomson named specimens of this Swedish species (Trans. Ent. Soc. 1886, p. 339), taken in the vicinity of Norwich by Bridgman.

32. similis, Gmel.

Ichneumon similis, Gmel. S. N. i. 2720, ♀. *Hemiteles similis*, Gr. I. E. ii. 793, excell. varr. 1 et 2; Ratz. Ichn. d. Forst. i. 150; Tasch. Zeits. Ges. Nat. 1865, p. 123, ♀ ♂ (*nec* Thoms.). Var. *H. nens*, Hart. Jahresb.; cf. Ratz. Ichn. d. Forst. i. 151.

A black, piceous or sometimes even testaceous species. Head with the palpi and mandibles flavous, and labrum red; clypeus not entirely discreted. Antennae of ♂ stout and attenuate, nearly as long as the body, with the scape stramineous beneath and flagellar joints discreted; of ♀ normal, rather longer than half the body, with the two basal joints rufescent, the sixth and following ferrugineous, beneath. Thorax gibbous; metathorax chiefly longitudinally rugose; areola entire, sub-glabrous, transverse and broadest basally; apophyses distinct though very short; metapleurae with white pubescence. Abdomen piceous-black, of ♂ narrower than the thorax, with the central segments parallel-sided, the basal aciculate and very slightly explanate with the post-petiole rather longer than broad and twice broader than the petiole; of ♀ ovate and as broad as the thorax, with the petiole narrow and parallel-sided and spiracles hardly projecting; post-petiole gradually explanate to the apex and densely aciculate; terebra half the length of the abdomen. Legs normal, testaceous; anterior trochanters of ♂ stramineous; hind legs with the coxae broadly black basally, apices of their femora and tibiae sometimes infusate. Wings ample, hyaline; stigma pale piceous, radix and tegulae bright stramineous; areolet with the external nervure obsolete or entirely wanting. Length, 3-5 mm.

I am convinced that Thomson's species under this name differs very materially from that of Taschenberg. The terebra is hardly half the length of the abdomen, and the antennae are not at all unusually stout, with the second flagellar joint shorter than the first.

The "Jahresberichte über die Fortschritte der Forstwissenschaft" appears to be a very scarce periodical, and I have failed to obtain Hartig's original description of *H. nens* at the libraries of the British Museum, Nat. Hist. Museum, Royal, Linnean, Zoological and Entomological Societies. Ratzeburg says (*loc. cit.*) that it differs little from *H. fulvipes* and *H. similis* and, especially in consequence of the infusate posterior margins of the abdominal segments, comes very close to the latter, of which he considered it to be a variety. He adds that its economy is identical with that of *H. fulvipes*, and that it had then (1844) been bred in widely differing localities. Kirchner (Cat. 66) tells us that it preys to such an extent upon the *Microgaster* infesting *Bombyx pini* [*Apanteles fulvipes*, Hal.] that very often these hyperparasites alone emerge.

It is, in fact, a common parasite upon *Microgaster* cocoons, often occurring as late as October, and probably hibernates in the perfect state.

Common in Norfolk (Bridgman); bred in the middle of August from an egg-bag of the house-spider, in Devon (Bignell); Yorkshire (Marshall); Maldon in Essex (Fitch). I possess it from Shere, Lyndhurst, South Leverton in Lincs., Bristol, Felden, Ryde, Kenton, Tuddenham Fen, and house windows at Southwold and Monks' Soham, from June to November. It has been bred from such widely different hosts as *Epeira diadema*, *Grapholitha tripunctana*, *Psyche calvella*, *Coleophora hemerobiella*, *Lithocolletis spinicolella*, *Lasiocampa pini* through *Microgaster* sp., and the galls of *Cynips Kollari*. Musham has bred it from an unknown host at Lincoln, in June; and Chitty captured it at Huntingfield, Kent, in October.

33. *auriculatus*, Thoms.

Hemiteles auriculatus, Thoms. O. E. x. 977; Schm. Term. Füz. 1897, p. 545, ♂ ♀.

A stout, black and shining species, with very uneven abdominal sculpture. Head triangular, black, with the ungeniculate mandibles red and palpi stramineous; vertex narrow and declived, frons smooth with the antennal scrobes auriculate; clypeus hardly discreted, apically mutic; epistoma sub-prominent and laterally obliquely sulcate. Antennae black, somewhat stout and nearly as long as the body; of ♀ basally rufescent. Thorax convex and nitidulous; mesonotum centrally, sparsely and somewhat strongly punctate; metathorax rugose with the areola laterally indistinct, emarginate at base and apex, and not elongate; lateral costae distinct, apophyses stout and obtuse; petiolar area obsoletely discreted. Abdomen broad and black, with the central segments transversely impressed; the basal strongly explanate and apically transverse, distinctly aciculate and apically glabrous; the three following segments coriaceous with their apical half glabrous; terebra rather longer than the first segment. Legs fulvous, usually with the coxae, trochanters, and base of the ♂ femora, black. Wings hyaline; fenestrae broadly separated; stigma piceous, radix and tegulae stramineous; nervellus antefurcal. Length, 4-5 mm.

This species resembles *H. melanarius*, but the head is smoother, the cheeks longer, mesonotum more sparsely punctate with elongate notauli, and the basal nervure is nearly vertical.

It has not before been recorded from Britain. Mr. Alfred Beaumont first took this Swedish species at Whitby, on 11th August, 1897, and kindly presented it to me. There are also four females in Dr. Capron's collection, presumably from Shere in Surrey.

34. *melanarius*, Grav.

Hemiteles melanarius, Gr. I. E. ii. 790, excell. varr. 1 et 2; Ratz. Ichn. d. Forst. ii. 128; iii. 153; Fonsc. Ann. Soc. Fr. 1852, p. 29; Holmgr. Sv. Ak. Handl. 1854, p. 57; Tasch. Naturg. wirb. Thiere, 260; Zeits. Ges. Nat. 1865, p. 130, ♂; Curt. Farm Ins. 102, pl. xv. fig. 6, ♂ ♀. *H. vicinus*, Gr. I. E. ii. 845; Tasch. Zeits. Ges. Nat. 1865, p. 125, ♀; Bridg. Trans. Ent. Soc. 1883, p. 150, ♂; cf. Kawall. Stett. Ent. Zeit. xvi. p. 230; Thoms. O. E. x. 982; Schm. Term. Füz. 1897, p. 525, ♂ ♀.¹

Head narrowed behind the eyes; frons coriaceous-rugose; ♂ palpi

¹ Modern Continental authors have given priority incorrectly to the ♀, presumably on account of "dignity of sex" (cf. Ratz. Ichn. d. Forst. iii. 172; Wesm. Bul. Ac. Brux. 1853, p. 301; etc.); the ♂ name however, being the earlier, must stand. [Since this was written, I see Schmiedeknecht has adopted the correct synonymy.]

usually stramineous; ♀ clypeus discreted and apically sub-reflexed. Antennae sub-filiform and shorter than the body. Thorax with the mesonotum coriaceous-rugose; metathorax short with complete areae and strong costae; areola narrow; petiolar area sub-discreted. Abdomen oblong-ovate, deplanate, finely alutaceous and confluent punctate with the apices of the basal segments sub-callose and nitidulous; of ♂ slightly narrower, of ♀ rather broader, than the thorax, sub-petiolate; of ♂ black, of ♀ with segments two to four and apex of the first rosy or castaneous; basal segment short and broad, strongly convex, gradually dilated apically and hardly twice longer than broad; post-petiole broad, as long as the petiole, of ♂ sub-quadrate, of ♀ transverse; terebra rather longer than half abdomen, red with valvulae black and gradually incrassate apically. Legs red; coxae and trochanters, except apices of latter, black; femora sometimes entirely black, usually with apices or base, and occasionally the anterior pairs mainly, red; tibiae except basally and apically red, rarely entirely black; hind tarsi infusate. Wings normal, of ♀ somewhat distinctly clouded; tegulae and the narrow stigma infusate, radix stramineous; areolet externally usually obsolete. Length, 4-5 mm.

Gravenhorst says the ♂ is similar to *H. tristator*, but with the basal segment shorter and broader; the ♀ resembles *H. ridibundus*, but its abdomen, especially the petiole, is shorter and broader, with the thorax less gibbous and the antennae longer and more slender. The distinct metathoracic lateral costae and ♀ clouded wings will distinguish it from both *H. floricator* and *melanogaster*. And from all our indigenous species the triangular head, rugosely coriaceous frons and mesonotum, clouded wings which have the basal nervure a little oblique, very finely striolate and transverse post-petiole, and the acute epipleurae of segments two to four will render it distinct.

This species is gregarious and usually, though not always, hyperparasitic; as many as eighteen specimens have been bred from a single host, whose chrysalis was filled with their thin, brown, honeycomb-like cocoons, with no trace of an intermediate parasite. Curtis first associated the sexes in 1860 and figured the female (reproduced in Ormerod's Guide, p. 122); he bred "an incredible number," considering their size, of males and females of this species in July or August from a single largish hole in the side of a pupa of *Pieris napi*.

It is a common parasite upon *Pieris brassicae* and economically a most beneficial insect. It is said to occur in June, September and October upon shrubs and umbelliferous flowers throughout Europe. Taschenberg bred both sexes from the above host in Germany and Laboulbène in France; in Devon, Bignell has raised it from *Pieris rapae*; and Bridgman tells us two males and sixteen females emerged from a single New Forest pupa of *Argynnis paphia*, on 8th July, 1882. It has also been bred from *Coleophora Giraudi*, Rag., by Giraud; both sexes from *Vanessa Calbum*, by Holmgren; *Psyche* sp., *Solenobia triquetrella*, *Pissodes notatus*, *Hylurgus piniperda* and from spiders' eggs (Bridg.-Fitch). It is said to be abundant at Glanvilles Wootton by Dale, and is recorded from Guernsey by Luff; there are two females in Dr. Capron's collection from Shere, and both Miss Chawner and I have taken it in the New Forest, in August.

35. *obscurus*, Bridg.

Hemiteles obscurus, Bridg. Trans. Ent. Soc. 1883, p. 54; Schm. Term. Füz. 1897, p. 526, ♂.

Head shining and transverse; epistoma prominent, clypeus distinctly discreted, mandibles somewhat broad, with the teeth sub-equal; frons deeply canaliculate semicircularly above scape. Antennae short; flagellum two-thirds length of body; basal flagellar joint thrice longer than broad, the apical ones quadrate. Thorax black, longer than high, dull, closely and distinctly punctate, with notauli distinct; metathorax nitidulous with irregular rugosities; petiolar area not discreted, sub-hexagonal; lateral areae entire; apophyses short and acute. Scutellum elongate, basally carinate. Abdomen sub-ovate, black; basal segment stout and with base of second transversely rugose; remainder shining and transverse; post-petiole sub-parallel-sided. Legs slender; front ones dull ochreous with coxae and trochanters, except apices of latter, black; posterior legs black, with apices of trochanters pale, femora and tibiae piceous, the latter becoming paler basally. Wings with radix pale, stigma normal and piceous; areolet pentagonal, externally wanting; discoidal recurrent nervure and lower half of transverse discoidal nervure wanting; transverse ordinary not interstitial; hind wing with lower nervures obsolete and the nervellus not intercepted. Length, 3 mm.

The shape of the abdomen resembles that of *H. fulvipes*, but the legs are more slender, the neuration is distinct, and the basal segment narrower.

The only known exponents of this species are two males bred from the egg-bags of a spider which Bridgman found at Norwich in a rolled-up nettle leaf, protected by the spider herself; one parasite was developed from each sac.

36. *laevigatus*, Ratz.

Hemiteles aestivalis, var. 3, Gr. I. E. ii. 808, ♀. *H. laevigatus*, Ratz. Ichn. d. Forst. ii. 128, ♂; Thoms. O. E. x. 973; Schm. Term. Füz. 1897, ♂ ♀. *H. furcatus*, Tasch. Zeits. Ges. Nat. 1865, p. 121, ♀.

Head with mouth flavous and vertex somewhat broad, not narrower behind the eyes; cheeks buccate; frons shining and smoothish; mandibles not tuberculate, with lower tooth obviously the shorter; clypeus very distinctly discreted, narrow and apically broadly rounded, with two central teeth. Antennae filiform, red beneath, flagellar joints not apically incassate. Thorax black; pronotum with no central carinae, mesonotum smooth and nitidulous; metathorax short with elongate longitudinal and two transverse costae; petiolar area nearly vertical, entire. Abdomen centrally nitidulous, with a transverse impression behind centre of second and third segments; the third red, fourth except sometimes dorsally, and the margin and sides of fourth, fulvous; remainder pale-margined; basal segment feebly aciculate throughout and gradually explanate apically; terebra black, and rather longer than first segment, with spicula fulvous. Legs pale flavidous; hind coxae basally nigrescent, the anterior sometimes flavescent beneath; trochanters flavous; hind tarsi and apices of their tibiae sub-infusate, latter in ♀ distinctly intumescent before the base. Wings hyaline, normal; tegulae and costae infusate; stigma dull testaceous, emitting radial nervure from its centre; radix distinctly white; areolet

pentagonal, with outer nervure very fine; nervelet distinct, nervellus evidently antefurcal. Length, 3-5 mm.

The slender form and metathoracic sculpture of this species are similar to *H. imbecillus*, but the shorter cheeks, the smooth frons and mesonotum, the third and fourth segments of ♀ entirely or mainly red, of ♂ black with the second smooth, the long and thin and sub-filiform flagellum, and the nigrescent posterior coxae, render it distinct.

This species is probably not uncommon in marshy situations throughout Britain. It is of frequent occurrence in Norfolk and has been bred from *Gracillaria auroguttella*, *G. phasianipennella* and *Coriscium cuculipennellum* (Bridgman); Bignell also bred a male from the last-named host on 20th August, 1884. Bred in South Devon from *Zygaena filipendulae* through a species of *Apanteles*, in July; from *Dianthaccia cucubali* at the end of May; and captured at Bickleigh early in August (Bignell). Taken in Yorkshire, at Cornworthy, Botusfleming, and bred from *Laverna decorella*, Ste. (Marshall). Also raised from *Chrysoclista Schrankella* and, perhaps through a species of *Ascogaster*, from *Laverna epilobiella* (Bridg-Fitch); Maldon in Essex (Fitch); several females captured about Shere by Capron, and a doubtful male at Botusfleming by Marshall; Tuck has found it at Norton Wood, near Bury St. Edmunds, early in October; Butler at Wymondley in Herts., in August. It has occurred to me in September on the flowers of *Foeniculum vulgare* at Alderton, and in August on those of *Angelica sylvestris* at Barton Mills and Brandon, in Suffolk. I am in a position to confirm the doubtful record of this species in the "Natural History of Hastings."

37. *biannulatus*, Grav.

Hemiteles biannulatus, Gr. I. E. ii. 846; Tasch. Zeits. Ges. Nat. 1865, p. 123; Brisch. Schr. Nat. Ges. Danz. 1881, p. 348, ♀; Thoms. O. E. x. 986; Schm. Term. Füz. 1897, p. 5289, ♂ ♀.

Black with fine infusate pubescence; clypeus discreted and apically broadly rounded; frons smooth. Antennae sub-filiform and apically incrassate; of ♂ black, of ♀ longer than half body, with joints seven to ten entirely white. Thorax with mesonotum smooth and notauli reaching to its centre; metathorax smooth with strong costae, rugosities and apophyses. Abdomen ovate, as broad as thorax, with anus sub-compressed; black with the three first segments red; basal segment somewhat elongate, gradually explanate and carinate, with no lateral tubercles; segments two to four with epipleurae acute; terebra rather longer than petiole. Legs slender, red; hind ones usually with tarsi and apices of tibiae infusate; coxae and trochanters of ♂ black. Wings grey; stigma infusate and not broad, emitting radial nervure from beyond its centre; radix white, tegulae black, nervellus antefurcal. Length, 4-6 mm.

Similar, especially in its broad basal segment, to *H. ridibundus*, but the antennae and legs are more slender. It may be known from all the species mentioned by Thomson in having the vertex narrower, the clypeus very distinctly discreted, apically rounded and immarginate; mandibles stout and not geniculate, the antennae stout and basally attenuate, its elongate notauli, distinct metathoracic costae, strong apophyses and somewhat stout tarsal claws.

This species was first brought forward as British by Rev. T. A. Marshall (in Ent. Ann. 1874, p. 142) on the strength of a single female taken at St. Albans; he says it is one of the largest species of the genus. Brundall in Norfolk, in May (Bridgman); a male at Plumstead early in August, 1897 (Beaumont).

38. *hemipterus*, *Fab.*

Ichneumon hemipterus, Fab. E. S. ii. 190; *Cryptus hemipterus*, Fab. Piez. 91; *Pezomachus hemipterus*, Gr. I. E. ii. 874, ♀. *Aptesis hemiptera*, Först. Wieg. Arch. 1850, p. 87, ♀; Bridg. Trans. Ent. Soc. 1887, p. 364, ♂. *Hemiteles hemipterus*, Thoms. O. E. x. 993, excl. ♂; Schm. Term. Füz. 1897, p. 554, ♂ ♀. *H. dissimilis*, Gr. I. E. ii. 842; Tasch. Zeits. Ges. Nat. 1865, p. 135; Schm. Term. Füz. 1897, p. 530, ♂. Var. macropt. Marsh. E.M.M. v. p. 157, ♀. Cf. *Phygadeuon nanopterus*, Kief. Hym. u. Dip. 1903, p. 111, ♀.

♂. Head black, transverse, smooth, with a few obsolete punctures, and contracted posteriorly; clypeus discreted and more nitidulous than the face. Antennae stout, setiform and two-thirds the length of the body, with the joints not discreted. Thorax short and immaculate, not broader than the head; mesonotum nitidulous, obsoletely punctate with distinct notauli; metathorax somewhat short, coarsely rugose, with scattered pubescence; costae strong and entire with the areola smooth and somewhat regularly hexagonal, with distinct costulae; petiolar area rugulose and discreted; apophyses acute. Abdomen sub-ovate, black, with scattered pubescence; sides and sometimes disc of the second segment castaneous, the third dark red with the apical angles black; basal segment somewhat slender with normal tubercles; post-petiole quadrate, parallel-sided, strongly rugose longitudinally, the second and sometimes the third distinctly aciculate with obvious spiracles. Legs somewhat slender, black, with the anterior tibiae, tarsi and apices of femora, red; hind tibiae and sometimes femora obscurely ferrugineous basally. Wings distinctly clouded with the stigma black and basally stramineous; radix testaceous, tegulae black; areolet pentagonal and externally imperfect, discoidal cell acute below; nervellus sub-opposite and intercepted below the centre. Length, 5-7 mm.

♀. Black with the seven or eight basal antennal joints red. Metathorax rugose, distinctly areated, apophyses acute. Scutellum small and gibbulous. Basal segment longitudinally rugose, apically red; second and third pale red; sixth and seventh white-margined; terebra nearly as long as abdomen. Legs red, apices of hind femora and tibiae piceous. Wings short, narrow, reaching beyond base of metathorax, infumate with half the stigma, two transverse fasciae and often the apex binotated with, white; tegulae black, radix white, areolet incomplete and pentagonal. Length, 4-6 mm.

The slender petiole and aciculate second segment of the ♂ appear to ally it with the species of *Panargyrops*, but the stout antennae and acute apophyses render the present position of this species the more tenable, especially since the ♀ is a robust insect. Marshall says that in its macropterous form, of which there are several in his collection (in Brit. Mus.), the ♀ has the wings longer than the abdomen, with the neuration of *Hemiteles*; they are infusate with half the stigma, a fascia beneath it and an apical spot, white.

It is very satisfactory to at length determine the true position of this ♀,

since Förster did not see Gravenhorst's type and placed it in *Aptesis*, from which it differs in its bicoloured antennae, solely on the very fallacious character of the wing development; Marshall (E.M.M. v. p. 155) writes, "It cannot be assigned to *Aptesis* unless the character of that genus, 'das erste Segment punctirt, nicht laengsrundig,' be modified, for the first segment is most distinctly wrinkled longitudinally."

Though hitherto overlooked, there can remain no doubt, I think, that Bridgman's ♂ of this species is identical with *H. dissimilis*, since the descriptions tally in every way, both as regards sculpture and colour.

The male is probably of much less frequent observation than the female. It has been captured by Bignell at Plym bridge in Devon, early in August, and I possess an example taken by Capron at Shere in Surrey, which has the second and third segments bright red, the former being broadly deep piceous discally. The female, however, is often found running over low herbage, and Bridg-Fitch say fully-winged examples are not infrequent. It has been bred, together with the male, by J. J. Walker from *Catoptria microgramma*, and is figured in Wood's "Insects at Home," p. 323. It is recorded from Dorsetshire (Ent. 1881, p. 137); both forms of the female from Milford Haven (E.M.M. v. p. 157); Piffard has taken it at Felden in Herts.; and Butler at Fairlight, near Hastings, in August.

A closely allied ♂ (*H. phloeas*, Boie, Stett. Ent. Zeit. 1855, p. 101) has been bred in Germany from *Polyommatus phloeas*.

39. scrupulosus, Grav.

Hemiteles scrupulosus, Gr. I. E. ii. 817, excl. var.; Tasch. Zeits. Ges. Nat. 1865, p. 135; Schm. Term. Füz. 1897, p. 530, ♂.

Head black with clypeus discreted and apically straight. Antennae sub-attenuate, shorter than body with the three basal flagellar joints red. Metathorax strongly rugose and pubescent with areae entire, petiolar area sub-oblique, apophyses small and acute. Abdomen oblong-ovate, deplanate; black, with second and third segments aciculate and red; basal segment sub-linear and only slightly explanate apically, thrice longer than broad and centrally canaliculate, coarsely aciculate with distinct spiracles. Legs somewhat slender, red, with coxae and base of trochanters black; posterior tarsi, apices of their tibiae and of the hind femora, nigrescent. Wings normal and slightly clouded, especially discally; stigma and tegulae dark, with base of former very white, radix stramineous. Length, 5 mm.

This species, which appears exclusively Italian, is regarded by Taschenberg as little more than a variety of *H. hemipterus*, in spite of its basally red antennae and immaculate red segments. I am certainly of opinion that its inclusion in our fauna must be regarded as very doubtful until further evidence than Marshall's bare record, in his 1870 Catalogus, be forthcoming.

40. chionops, Grav.

Hemiteles chionops, Gr. I. E. ii. 797; Tasch. Zeits. Ges. Nat. 1865, p. 125, ♂; Thoms. O. E. x. 973, ♂ ♀.

Head with mouth, and in ♂ face, white; mandibles with the lower tooth much the smaller; clypeus mutic, discreted, basally foveate and

apically truncate, straight and broad. Antennae with scape of ♂ white beneath. Pronotum not carinate. Abdomen black, with the third segment basally fulvo-stramineous; basal segment aciculate, terebra longer than the slender petiole. Legs fulvous; ♂ with anterior coxae, except the intermediate ones above, and trochanters white; hind coxae above, their tarsi and apices of their tibiae infuscate. Wings sub-hyaline, stigma and costae piceous; radix and tegulae white; areolet wanting; nervellus antefurcal. Length, 4-5 mm.

In conformation like *H. similis*, but the white mandibles and straightly truncate clypeus are very distinct. Thomson says this species may be known by the head being somewhat narrowed behind the eyes, the frons and mesonotum densely and very finely punctate and pubescent though not dull, the metathoracic lateral costae entire, petiolar area shining and not discreted, wings hyaline with antefurcal nervellus, antennae elongate and filiform and brown, clypeus deeply discreted and immarginate, with the apex in the ♀ nearly emarginate, and in ♂ quite truncate, and by the quadrate, obsoletely and sparsely punctate second segment.

Probably not uncommon, and occurring in the middle of May, throughout north and central Europe. Earlham and Eaton, Norfolk, in May, August and September (Bridgman).

41. *rufocinctus*, Grav.

Hemiteles rufocinctus, Gr. I. E. ii. 811; Tasch. Zeits. Ges. Nat. 1865, p. 127; Brisch. Schr. Nat. Ges. Danz. 1881, p. 347, ♂; Schm. Term. Füz. 1897, p. 531, ♂ ♀ (*nec* Ratz.). Var. *Heminachus rufocinctus*, Bridg. Trans. Ent. Soc. 1883, p. 158, ♂ ♀.

♂. Head with palpi stramineous and clypeus not discreted. Antennae sub-filiform with the joints confluent, as long as body and sometimes basally ferrugineous beneath. Metathorax with two transverse but no lateral costae, slightly rugose centrally. Abdomen fusiform, as broad as thorax, black, third segment red or stramineous with a transverse black line before apex, the second concolorous apically and usually with two basal castaneous dots but sometimes entirely black, remainder occasionally red-margined; post-petiole parallel-sided, hardly longer than broad and nearly as long as the explanate petiole; second punctate. Legs pale red, with coxae, except usually apices of the anterior, black; hind tarsi, apices of their tibiae, and their femora except basally, nigrescent. Wings somewhat ample and clouded; stigma piceous, radix and tegulae stramineous. Length, 3-5 mm.

Gravenhorst mentions a var. with the scape, coxae and only margins of two basal segments, red.

♀. Head finely rugose, somewhat shining, black. Antennae as long as body, attenuate from centre, and basally red. Thorax finely rugose, somewhat shining, with mesonotum dull and notauli distinct; metathorax smooth, with two transverse costae; petiolar area small and not discreted. Abdomen nitidulous, black, with third segment except discally red, and the fourth laterally paler, anal segments apically flavous; basal segment as long as terebra, sub-glabrous with obsolete carinae; second segment finely and sparsely punctate, and aciculate basally. Legs slender, fulvous, with anterior coxae and trochanters whitish; hind coxae black, with their tarsi, apices of their femora and tibiae, piceous. Wings hyaline, with stigma

testaceous and tegulae white; areolet regular, with outer nervure wanting; nervellus antefurcal. Length, 5 mm.

Bridgman's insect agrees well enough with this species in its rough metathorax and wanting areola, though it differs somewhat in the conformation of the post-petiole and abdominal coloration. He says, however, that it is the *H. rufocinctus* of neither Gravenhorst, Taschenberg, nor Brischke; it was taken by Dr. Capron, probably at Shere in Surrey. Brischke tells us that he bred this insect from a species of the Tenthredinid genus *Fenusa*, in Prussia.

Referring to Marshall's article on *Hemimachus instabilis*, Först. (Cat. 1872, p. 46), the above synonymy must be deleted, since it is now considered that the present species is distinct from that of Ratzeburg, which is still supposed to be the ♂ of *instabilis*, but, if it is, it is synonymous with the ♂ assigned to it by Thomson as an undescribed insect.

42. *varicornis*, Grav.

Hemiteles varicornis, Gr. I. E. ii. 837; Tasch. Zeits. Ges. Nat. 1865, p. 121; Schm. Term. Füz. 1897, p. 532, ♀.

Head black, with the palpi and mandibles red; clypeus discreted and sparsely punctate; face pubescent with the epistoma prominent; frons distinctly punctate and shining. Antennae short, filiform and apically incrassate; infusate, with the five basal joints fulvous, and the ninth to eleventh white. Thorax black, mesonotum sparsely punctate and strongly nitidulous with the notauli obsolete; metathorax very coarsely rugose with no distinct costae; petiolar area not discreted. Abdomen glabrous, black, with the second and third segments bright red, the latter usually black apically; basal segment aciculate with the post-petiole gradually explanate apically and spiracles not very prominent; the second glabrous; terebra one-sixth of the length of the abdomen. Legs testaceous; the hind ones with the tarsi, apices of femora and of tibiae, with the base of the latter, infusate or black. Wings somewhat narrow and evenly clouded; the narrow stigma and the costa pale piceous, with base of the former distinctly paler; radix and tegulae pale stramineous; marginal cell somewhat short, nervellus antefurcal. Length, 3 mm.

The sculpture of the metathorax, as described by Taschenberg, resembles that of *Pezomachus* rather than *Hemiteles*; but I am inclined to suspect some error here, for in all the specimens I have examined, which coincide exactly in all other respects with this species, the areola is sufficiently distinct (sub-parallel-sided, truncate at base and apex, longer than broad and emitting the costulae slightly before its centre) and the apical transverse costa is distinctly strong, but with no apophyses.

Dr. Capron captured several specimens in the vicinity of Shere in Surrey, from a study of which I have been enabled to elaborate the above description. On the Continent it appears to be only known in Germany, and has not yet been bred. I have taken females in July at the roots of rushes at Wherstead and in tufts of *Carex paniculata* at Foxhall, near Ipswich, late in November. When disturbed, even during hibernation, this species does not feign death, like the majority of the genus. Evans has taken a ♀ at Bavelaw, near Edinburgh.

43. *dubius*, Grav.

Hemiteles dubius, Gr. I. E. ii. 836; Tasch. Zeits. Ges. Nat. 1865, p. 122; Schm. Term. Füz. 1897, p. 532, ♀.

Head black. Antennae apically incrassate, with the five basal joints, or only the scape beneath, red. Metathorax very feebly rugose, with distinct areae. Abdomen glabrous, oblong-ovate with the fourth segment as broad as the thorax; second segment except sometimes its apical margin, and often base of the third, red; basal segment sub-linear, dorsally scabriculous, gradually slightly dilated apically, nearly twice longer than broad, with no tubercles; terebra one-third the length of the abdomen. Legs pale red; hind ones with base of the coxae and sometimes apices of femora nigrescent, and the tibiae apically infusate. Wings hyaline; stigma and costa piceous; radix and tegulae white. Length, $2\frac{1}{2}$ mm.

In size and conformation, especially of the antennae, it exactly resembles *H. fulvipes*, but the basal segment is narrower; it is also like *Phygadeuon fumator*, but the areolet is incomplete and the terebra rather shorter (compare *Phygadeuon rotundipennis*, Thoms., p. 100, *ante*).

Marshall brought this species forward as British in his 1870 Catalogue, but I know of no details of capture, and it does not appear to have been rediscovered on the Continent since its original record from Warmbrunn, in Silesia.

44. *ridibundus*, Grav.

Hemiteles ridibundus, Gr. I. E. ii. 844; Tasch. Zeits. Ges. Nat. 1865, p. 128; Schm. Term. Füz. 1897, p. 539, ♀.

Head black with the mandibles sometimes centrally piceous; clypeus discreted and apically straight; epistoma slightly prominent. Antennae stout and filiform, rather longer than half the body, with joints conical, distinct and somewhat incrassate; the fourth to sixth ferrugineous. Metathorax rugulose; costae strong and areae complete; apophyses sub-acute. Abdomen ovate, as broad as the thorax; segments two to four and the apex of the first red or castaneous, with the margins of the following sometimes, whitish; basal segment closely and confluent punctate, carinate and sub-tuberculate, gradually dilated apically, with the post-petiole transverse, shorter and thrice broader than the petiole; terebra hardly longer than half the abdomen. Legs normal, red with all the coxae and trochanters black; hind tarsi and apices of their tibiae, darker or nigrescent. Wings clouded with the tegulae infusate, radix and base of stigma whitish; areolet pentagonal with the outer nervure sub-obsolete. Length, 6 mm.

This is probably not an uncommon species with us; it occurs throughout central and southern Europe. Bignell has taken it at Shaugh bridge at the end of May, and at Laira early in June. I possess examples from both Capron's and Piffard's collections, from Surrey and Hertfordshire.

45. *balteatus*, Thoms.

Hemiteles balteatus, Thoms. Ann. Soc. Fr. 1885, p. 28, ♂ ♀.

Black and slightly shining. Head as broad as thorax, hardly narrowed posteriorly, vertex somewhat broad and not declived; frons flat, parallel-sided, densely and very finely alutaceous and slightly shining; cheeks

sub-buccate and not long ; clypeus apically mutic, mandibles basally raised and tuberculate. Antennae longer than half the body, slender ; of ♀ sub-filiform, black, with the flagellum basally testaceous, its basal joint linear and thrice longer than the sub-globose scape which, with the pedicellus, is dull testaceous ; of ♂ black, apically sub-attenuate with the joints somewhat discreted. Thorax somewhat elongate ; mesonotum shining, densely and very finely alutaceous, with indistinct notauli ; metathorax sub-rugosely punctate with complete areola, emitting costulae before its centre. Abdomen of ♀ oblong, of ♂ strongly elongate, not very convex and apically sub-dilated ; segments two to four red and smooth, but not apically callose ; basal segment somewhat curved and broad, sub-rugose throughout, with no dorsal carinae ; tubercles only just behind the centre ; second segment obviously, third and fourth hardly, punctate ; terebra almost shorter than the basal segment. Legs slender, fulvous with the tarsal claws small and ♂ coxae black. Wings griseous-hyaline, of ♀ with a small cloud before the incomplete and not large areolet ; tegulae and stigma black, latter basally pale and not broad, emitting the short and curved radial nervure a little beyond its centre ; nervellus hardly antefurcal. Length, 4 mm.

This species is allied to *H. floricator*, but differs in the apices of the segments not being callose, the basally tuberculate mandibles, the colour of the legs and the rugose petiole.

Bridgman records (Trans. Ent. Soc. 1886, p. 104) a female of this French species from the now demolished Heigham osier carr, near Norwich, in August.

46. imbecillus, Grav.

Hemiteles imbecillus, Gr. I. E. ii. 813 ; Tasch. Zeits. Ges. Nat. 1865, p. 121 ; Schm. Term. Füz. 1897, p. 543, ♂ ; Bridg. Entom. 1880, p. 55, ♀.

A narrow and strongly elongate species. Head with the mandibles and labrum badius ; clypeus discreted, apically straight and sub-reflexed. Antennae slender, filiform and rather shorter than the body. Thorax cylindrical ; metathorax elongate and irregularly rugose, with the areola elongate-hexagonal and the petiolar area discreted. Abdomen narrower than the thorax, with segments two to six parallel-sided ; basal segment sub-linear, post-petiole aciculate, twice longer than broad and a little broader than the elongate petiole ; segments two, three except sides and apex, and the base of the fourth, stramineous or fulvous ; terebra half the length of the abdomen. Legs slender ; the anterior ferrugineous with the coxae and trochanters basally black and the femora testaceous, infusate to beyond their centre ; hind ones black, with apices of the trochanters and base of the tibiae ferrugineous. Wings normal, hyaline ; stigma and costa piceous, radix and tegulae dull stramineous ; areolet pentagonal with the outer nervure obsolete. Length, 5 mm.

Taschenberg says it has been bred from the galls of *Rhodites eglanteriae*, Hart., and Bridgman raised both sexes from the cocoons of *Apanteles glomeratus* upon *Pieris brassicae*, probably at Norwich. It is said to occur in May, and is common in Norfolk ; and Bignell has captured it at Dousland in Devon, towards the end of August. On the Continent, where Siebold has bred it from *Fumea intermediella*, it is only recorded from Germany.

47. *persector*, *Parfitt*.*Hemiteles persector*, Parfitt, E.M.M. 1881, p. 184, ♀.

A shining species with no perceptible sculpture and dull metathorax. Head transverse; clypeus distinctly discreted, mandibles and palpi flavous; cheeks elongate and not buccate; face shortly pubescent with epistoma somewhat prominent; facial orbits divergent, sub-approximating above. Antennae long and slender with joints not quadrate; flagellum seventeen-jointed with basal joint longer than second and about five times longer than broad; three basal joints red. Thorax sub-pubescent with notauli indistinct; metanotum short with areola transverse, laterally rounded, basally inflexed and sub-obsolete costate apically; petiolar area oblique, discreted and centrally parallel-sided; spiracles circular. Abdomen ovate with segments transverse, and very short from the fourth; segments two to four red; the basal elongate, narrow, apex double breadth of base, with spiracles just beyond centre; post-petiole bicarinate and centrally sub-canaliculate; terebra nearly two-thirds of abdomen. Legs somewhat slender; red, basally paler and with the hind ones darker. Wings with areolet pentagonal and wanting externally; apex of discoidal cell further from base than that of areolet; nervellus sub-opposite and intercepted below centre. Length, 4-5 mm.

Parfitt says "this insect has the facies of *H. gyrini*, but that the basal half of the antennae is red, the thorax quite smooth without any lines or markings and the abdomen is broadly ovate, all of which distinguish it from the former insect."

It does not appear to have been recognized here or upon the Continent, since it was originally recorded as bred from some pupae of *Gyrinus natator*, collected by the Rev. J. Hellins, from rushes on the banks of the Exeter canal. It did not, however, emerge till later than *H. gyrini* (*argentatus*, Grav.), with which it appears to be associated.

48. *tenuicornis*, *Grav.**Hemiteles tenuicornis*, Gr. I. E. ii. 843; Tasch. Zeits. Ges. Nat. 1865, p. 123; Schm. Term. Füz. 1897, p. 532, ♂ ♀.

Head black with clypeus not distinctly discreted. Antennae slender, filiform, rather shorter than body, especially in ♂. Metathorax rugose; costae strong and apophyses sub-acute. Abdomen of ♂ fusiform, of ♀ ovate and sub-pilose; segments two to six red or castaneous, of ♀ with the seventh and apex of the first concolorous; basal segment irregularly aciculate, obsolete carinate, slightly dilated apically, with no tubercles, of ♂ sub-linear, of ♀ smooth and nearly thrice longer than broad; terebra about half the length of abdomen, black with the spicula red. Legs slender, red or castaneous; coxae and trochanters black; posterior tibiae and tarsi with part of the femora infuscate. Wings normal, hyaline; stigma, costa and tegulae infuscate; radix whitish; areolet pentagonal with the outer nervure sometimes obsolete; ♀ with a dark cloud beneath the stigma. Length, 5-7 mm.

This species is said to occur in June and September. It was introduced as British by Marshall in 1870, but I have heard of no records. It should,

however, certainly be found with us, since it ranges throughout northern and central Europe.

49. oxyphimus, Grav.

Hemiteles oxyphimus, Gr. I. E. ii. 815, ♂; Tasch. Zeits. Ges. Nat. 1865, p. 123; Brisch. Schr. Nat. Ges. Danz. 1881, p. 347; Schm. Term. Füz. 1897, p. 538, ♂ ♀. *H. palpator* (? Müll. Prodr. n. 1832), Gr. I. E. ii. (form. typ.) 818, excl. ♂¹; Ratz. Ichn. d. Forst. ii. 130, ♀. *H. litoreus*, Parfitt, E.M.M. 1881, p. 272, ♂ ♀. Var. *H. palpator*, var. 5 et (?) 1, Gr. I. E. ii. 822, ♀.

Head of ♂ with the palpi infusate, of ♀ with the mandibles usually centrally red; clypeus distinctly discreted, apically rounded and nodulose. Antennae filiform and shorter than the body; of ♀ with the joints apically incrassate and the central ones rufescent; flagellar joints of ♂ not discreted. Metathorax slightly rugose with the costae and apophyses distinct; of ♂ more coarsely sculptured, with the petiolar area discreted. Abdomen of ♂ only slightly narrower than the thorax, deplanate and oblong-fusiform; of ♀ ovate and as broad as the thorax; segments two to four and in ♀ apex of the first pale red, the seventh of ♀ apically whitish; basal segment aciculate, carinate, with acutely prominent spiracles; post-petiole quadrate, rather shorter and twice broader than the linear petiole, of ♀ very slightly explanate, of ♂ parallel-sided; second segment of ♂ completely aciculate centrally; terebra a little shorter than half the abdomen. Legs normal; coxae and trochanters more or less black; femora and tibiae red with apices of the hind ones black; tarsi infusate with the basal joint of the front ones red. Wings in centre and at apex sub-infumate, especially discally in ♀; stigma dark, radix white, tegulae black. Length, 4-6 mm.

The variety *palpator* appears to be the commonest form in Britain; this has the second and third segments marked with black, the latter being only basally red; the seven basal antennal joints are rufescent beneath, the second alone being red throughout; the wings are clouded with the apices and a discoidal fascia hyaline.

The conformation of the ♂ basal segment and its acute tubercles differ from all our other *Hemiteles*.

The only point in Parfitt's description of *H. litoreus* which does not entirely coincide with the present species is the colour of the antennae, which are said to have "the basal joints rusty red beneath in some, in others entirely rusty red at the base." It was captured by sweeping herbage, *Aster tripolium*, etc., on the seashore near Woodbury Road Station in May, 1881, and near the sea in the Exminster marshes.

This species, which is said by Westwood to prey upon spiders, has been bred from *Cynatophora ocularis* by Marshall, as well as from the marble galls of *Cynips Kollari* and *Anobium*-infested oak bark. Fitch has taken it at Maldon in Essex; Bignell at Bickleigh in Devon, in September; and Bridgman at Earlham in Norfolk, in September.

¹ The ♂ of this species, as described by Gravenhorst, is the ♂ of *Hemimachus trux*, of Marsh. Cat. 1872, which Bridgman says (Trans. Ent. Soc. 1886, p. 341) was incorrectly named by Marshall, "and must, I think, be removed from our list"; it is treated as a true *Hemiteles*—"♀ unbekannt"—by Schmiedeknecht in 1905 (see notes under *Pezomachus palpator*, post). The only example placed as this species in the British Museum collection is a ♂, belonging to the *Stilpnides*!

50. *meridionalis*, Grav.

Hemiteles meridionalis, Gr. I. E. ii. 834; Schm. Term. Füz. 1897, p. 538, ♀; cf. Tasch. Zeits. Ges. Nat. 1865, p. 128.

Head with palpi and mandibles stramineous; clypeus discreted and apically rounded. Antennae slender, filiform, shorter than body; infusate or ferrugineous, darker above with scape red beneath. Metathorax reticulate with areae entire; areola regularly hexagonal, apophyses small and acute. Abdomen oblong-ovate, as broad as thorax; black, with second, base of third and apex of first segments, red; basal segment aciculate, gradually dilated apically, nearly thrice longer than broad; second punctate; terebra hardly longer than a quarter of the abdomen. Legs normal, red; hind ones sometimes with tarsi and apices of tibiae, occasionally also of femora, infusate. Wings hyaline, stigma infusate; radix and tegulae white. Length, 5 mm.

I should certainly expect there to be some error in the inclusion of this species in the British fauna, since it is only known on the Continent from Geneva, had not Bignell captured it at Bickleigh in Devon, on 6th September (Trans. Devon. Assoc. 1898, p. 486).

51. *macrurus*, Thoms.

Hemiteles macrurus, Thoms. O. E. x. 985; Schm. Term. Füz. 1897, p. 536, ♀ (? ♂).

Black. Head narrowed behind the eyes with vertex not broad, frons dull and pubescent, clypeus not discreted but apically rounded, mandibles narrowed apically and not tuberculate. Antennae stout, filiform, with scape shortly cylindrical and a little excised apically. Mesonotum somewhat dull; metathorax smooth with costae complete. Abdomen centrally dull, testaceous; petiole slender with spiracles somewhat far behind centre; epipleurae of third segment not inflexed; terebra as long as abdomen. Legs stout. Wings with stigma pale, emitting radial nervure from its centre; areolet with outer nervure elongate; nervellus antefurcal. Length, 4 mm.

This species is very like *H. similis*, but the antennae are longer, the terebra as long as abdomen, the epipleurae of second segment narrow, with spiracles far from the margin and the much longer external nervure of the areolet, will render it distinct.

This species, which is found in Sweden and Hungary, claims a position in our fauna upon the somewhat slender right of a female, said to have been taken in the London district in August, 1889, which was exhibited at a meeting of the South London Entomological Society in March, 1890.

52. *argentatus*, Grav.

Hemiteles argentatus, Gr. I. E. i. Suppl. 713; Schm. Term. Füz. 1897, p. 536, ♀. *H. gyrini*, Parfitt, E.M.M. 1881, pp. 79 et 88; Trans. Devon. Ass. 1881, p. 261, ♂ ♀; cf. Bridg. Trans. Ent. Soc. 1882, p. 144 et 1886, p. 339.

Head shining and impunctate, the face clothed with distinct silvery pilosity; ♂ with palpi white, mandibles centrally red and the vertex subpilose. Antennae filiform and very little shorter than the body; of ♀

with the scape, pedicellus and two basal flagellar joints red, the latter sub-equal and more than thrice longer than broad; of ♂ piceous, densely pubescent with the first flagellar joint basally flavidous. Thorax black with yellowish pubescence; notauli very distinct and in ♂ basally coalesced; metathorax dull and densely pubescent with the costae strong; areola subparallel-sided, of ♀ transverse and apically emarginate, of ♂ elongate and apically truncate; petiolar area discreted; apophyses wanting. Abdomen of ♀ glabrous, shining and sparsely pubescent and ovate, of ♂ sub-cylindrical with the basal segments distinctly punctate; segments two to four or five and the apex of the first red or castaneous, with their apical margins paler; basal segment bicarinate throughout, hardly explanate, with distinct tubercles, of ♂ sub-linear and laterally margined, with the tubercles obsolete; second segment elongate, third of ♀ sub-transverse, of ♂ quadrate; terebra black with the spicula red, half the length of the abdomen. Legs slender, somewhat elongate, with the posterior tarsi infusate, remainder red. Wings slightly clouded, stigma black, radix and tegulae pale; nervellus antefurcal; fenestrae narrowly discreted. Length, 5-6 mm.

Gravenhorst says *H. argentatus* is like *H. tenuicornis*, but with the antennae stouter and metathorax mutic; Bridgman adds that the ♀ of *H. gyrini* is very similar in shape to *H. formosus*, but the basal segment is shorter and stouter, and that the ♂ resembles *Orthopelma luteolator*, though it is yet more slender; this ♂ is, however, a much slighter insect, with longer legs, wings and antennae.

I am certainly of opinion, from a comparison of the descriptions and a study of Parfitt's types, that Thomson's supposition regarding the synonymy of these species is correct, at all events in so far as Gravenhorst's inadequate notes allow one to judge; and I anticipate that its more natural position is to be found in the genus *Panargyrops*.

Hope sent a female *H. argentatus* to Gravenhorst, taken about Netley in Shropshire, which is neither in the latter's collection nor in that of Hope at Oxford (*cf.* Entom. 1883, p. 102); Bridgman records it from Brundall near Norwich, in May. Mr. Parfitt first bred the males of his *H. gyrini* in the autumn of 1880; early in the following July he bred females from spring pupa-cases, and Bignell also raised it, from pupae of *Gyrinus natator* found by the Rev. J. Hellins upon rushes on the banks of the Exeter Canal, of which the latter has allowed me to examine both sexes; it is later recorded as bred from the same host, together with *Pezomachus (?) viduus*, Först. One is led to wonder whether the latter could have been a dimorphic female of the same species.

53. nitidus, Bridg.

Hemiteles nitidus, Bridg. Trans. Ent. Soc. 1889, p. 416; Schm. Term. Füz. 1897, p. 540, ♀.

Smooth, shining and black. Head transverse, slightly narrowed behind the eyes and anteriorly triangular; clypeus apically sub-truncate, face finely punctate, frons deeply foveate. Antennae three-quarters length of body, sub-filiform and slightly incrassate apically, with the three basal flagellar joints sub-equal in length and nearly thrice longer than broad. Mesonotum very finely punctate with distinct notauli; metathoracic areae

distinct, areola sub-triangular and hardly longer than broad, basal area transverse, triangular and apically sub-spinose laterally. Abdomen elongate-ovate, anus sub-compressed and membranaceous; second, apex of first and disc of third segments red; basal segment very finely aciculate, twice longer than its apical breadth, which is thrice the basal, second segment sub-transverse; terebra deflexed and rather longer than half the abdomen. Legs normal, red with hind trochanters mainly black and the tarsi partly infusate. Wings with stigma black, tegulae pale piceous; areolet with outer nervure wanting; nervellus antefurcal and intercepted below centre. Length, 5 mm.

It is very like *H. ridibundus*, Grav., but the head and thorax are smoother and more shining, the coxae are red and the stigma is not basally white. I find no pertinent distinction between the above description and that of *H. decipiens*, Grav., and am strongly of opinion that these species are synonymous.

This unique female was bred by W. H. B. Fletcher from a cocoon found at Chesil Beach, April 24th, 1884.

54. *decipiens*, Grav.

Hemiteles decipiens, Gr. I. E. ii. 825; Tasch. Zeits. Ges. Nat. 1865, p. 124, ♀. Brisch. Schr. Nat. Danz. 1881, p. 347, ♂ ♀.

Head with the centre of the mandibles badius and the clypeus discreted. Antennae slender, shorter than the body with the joints cylindrical. Thorax black; metathorax finely alutaceous, of ♂ oblique; areola longer than broad, with the costae not prominent and the petiolar area distinctly discreted. Abdomen ovate, as broad as thorax; black, with three central segments and apex of the first red, laterally (and the fourth apically) infusate; ♀ with segments five to seven apically whitish, ♂ with fifth broadly red longitudinally in the centre; basal segment narrow and thrice longer than broad, very slightly dilated apically, aciculate, obsoletely bicarinate and canaliculate, with no tubercles; second segment closely and finely punctate, of ♂ narrow and elongate, gradually explanate and usually laterally infusate; terebra rather longer than half abdomen. Legs slender, red; hind tarsi and apices of their tibiae infusate; ♂ with trochanters and often coxae flavidous. Wings normal, slightly clouded with stigma and costa black, radix and tegulae stramineous. Length, 6 mm.

Taken by sweeping in the Duryard estate, near Exeter, in August (Parfitt). It is only known on the Continent from Germany, where Brischke bred it from *Lipara lucens*. [Laboulbène records *H. liparae*, Gir., as a parasite on *Lipara tomentosa*, in *Arundo* stems. Ann. Soc. Fr. 1877, p. 401.]

55. *stagnalis*, Thoms.

Hemiteles stagnalis, Thoms. O. E. x. 987, ♀.

A slender, black species. Head sub-triangular and somewhat narrowed behind the eyes; vertex broadish, clypeus produced, frons dull. Antennae nearly as long as the body, filiform, with the scape globose and sometimes red. Mesonotum somewhat dull, with elongate notauli; metathorax sub-rugosely punctate with distinct costae; areola emitting the costulae from

before its centre. Abdomen with segments two to four broadly red and nearly glabrous with the epipleuræ inflexed; post-petiole sub-linear, stout, centrally highly arcuate, strongly rugulose, with distinct carinae and nearly central spiracles; terebra shorter than the basal segment. Legs slender and red, hind ones apically black; tarsal claws somewhat stout. Wings griseous, stigma not broad, nervellus post-furcal. Length, 4 mm.

Bridgman (Trans. Norf. Soc. 1893, p. 615) records this Swedish species from Britain; he says he has bred it from a spider's nest and captured it at Brundall and the Heigham osier carr, both near Norwich. He seems, however, to rather protest against Professor Thomson's identification of his specimens: "This species I considered *H. varitarsus*, Grav., with which description it agrees exactly." One must, nevertheless, suppose that Thomson knew his own species.

56. *aestivalis*, Grav.

Hemiteles aestivalis, Gr. I. E. ii. 805, excl. var. 5; cf. i. Suppl. 712; Ratz. Ichn. d. Forst. i. 152; Tasch. Zeits. Ges. Nat. 1865, p. 129; Thoms. O. E. x. 988, ♂ ♀. Var. *H. modestus*, Gr. I. E. ii. 858, ♀. Var. *H. ruficollis*, Gr. lib. cit. 853, ♀. (?) Var. *H. palpator*, var. 2, Gr. lib. cit. 820, ♀.

Head shortly triangular, black, of ♂ with the palpi and mandibles stramineous with apices of the latter ferrugineous; frons alutaceous; vertex narrow and declived; clypeus deplanate, short and narrow, prominent and apically obliquely truncate; mandibles stout and the cheeks elongate. Antennae inserted low on the face, filiform and shorter than the body; post-annellus hardly half as long again as the sub-cylindrical and hardly excised scape; ♂ with the flagellar joints not discreted and scape stramineous beneath; ♀ with the flagellar joints short and conical and the scape ferrugineous beneath. Thorax strongly convex and anteriorly elevated; black, with ♀ propleuræ more or less rufescent and the pronotum castaneous; mesonotum finely punctulate; metathorax very short, punctulate, with distinct costae and complete areae; areola strongly transverse, hexagonal and longitudinally rugose; petiolar area vertical, discreted and reaching far beyond the centre. Abdomen coarctate, oblong-ovate, black with the second and third segments more or less broadly red laterally and basally; of ♂ deplanate and narrower than the thorax, its basal segment deplanate and coarsely punctate with the petiole narrow and not rimose, post-petiole quadrate and a little broader than the petiole, tubercles sub-obsolete and far behind the centre; of ♀ as broad as the thorax with the basal segment gradually explanate apically, with the post-petiole quadrate and slightly shorter than the petiole; anterior segments nitidulous, distinctly and evenly punctate; terebra as long as the first segment. Legs stout and red, with the calcaria elongate; of ♂ paler, with the anterior trochanters stramineous, hind coxae and a mark on the intermediate black and the apices of the hind tibiae sub-infusate. Wings normal, clouded by a somewhat distinct fascia beneath the stigma, which latter is narrow, basally broadly white and emits the radial nervure from its third part; radix white; tegulae of ♂ stramineous, of ♀ infusate; areolet pentagonal with the outer nervure sub-obsolete; basal nervure vertical, discoidal cell short and nearly right-angled; nervellus opposite. Length, 4-5 mm.

Gravenhorst gives five varieties of this species. (1) Both sexes with all the coxae black, sculpture of the metathorax and abdomen coarser and the petiolar tubercles more prominent; this he took on *Crataegus oxyacanthus* in May. (2) With the extent of the red markings on the second and third segments variable; female only, occurring in September. (3) Female with base of the hind coxae alone black, the third segment entirely fulvous and the four apical ones pale-margined. (4) Female with the second segment entirely red, basal segment sub-glabrous—he describes that of the type form as smooth—and the antennae basally immaculate. (5) Female with the two basal segments nearly wholly, and all the coxae, red, which he knew only from Hope's captures at Netley in Shropshire. Besides these, the var. *modestus* has the cheeks yellow, the prothorax laterally, the clypeus and all the legs red, with the wings only slightly clouded discally; and the var. *ruficollis* has the thorax red with a mark before the black scutellum and the disc of the metathorax black, the wings slightly clouded, and the two basal segments except the apex of the second testaceous-red, glabrous or indistinctly punctate. I possess both sexes of a yet more remarkable variety, which Thomson would probably have accorded specific rank, in that the nervellus is very distinctly antefurcal (proving, I think, that character to be of but little value); in other respects, both sexes differ from the type form in having the three basal segments entirely glabrous, with the hind tibiae flavous and nigrescent at both base and apex; the scutellum of the ♂ with two apical flavous dots, of ♀ either black or with the sides and whole apex flavous. Mr. Bignell, too, has sent me for identification a female which undoubtedly belongs to this species, with the mesonotum anteriorly red; it is perfectly normal in the conformation of the antennae, head, abdomen and legs; but differs in having only the smallest traces of wings and the metathoracic costae sub-obsolete and much modified in outline, clearly indicating that the propodial development is in direct ratio with that of the wings.

This species differs from *H. stagnalis* in having the discoidal cell with its lower angle acute or hardly right-angled, not obtuse, and in emitting the parallel nervure below its centre. It is rendered distinct by the strong and transverse areola, vertical petiolar area, convex thorax, punctate petiole, cylindrical scape and sub-opposite nervellus.

Common in Norfolk (Bridgman); Huntingfield in Kent (Chitty); captured at Exminster and Shaugh bridge in June (Bignell); Yorkshire, Botusfleming in Cornwall, and Hertfordshire (Marshall); abundant at Glanvilles Wootton (Dale); Maldon in Essex (Fitch); Wyre Forest (Martineau). This is a very distinct and common species throughout England; Shere, Felden, Greenings in Surrey, Redland near Bristol; Benacre Broad, Finborough Park, Marlesford on *Heracleum sphondylium*, in Suffolk; Wicken Fen and Diss; from early June to the end of August. Of my antefurcal variety, I have females taken by Capron probably at Shere in Surrey and a male captured by Elliott in the Bentley Woods near Ipswich, on 16th June, 1900. This species has been bred by both Ratzeburg and Giraud from *Chrysopa perla*, from an undetermined species of the same genus by Brischke, who also raised it hyperparasitically from a *Microgaster*. The var. *modestus* has been bred by Ratzeburg from *Helioidines Roesella*, *Anobium domesticum*, *Pissodes notatus* and *Scolytus destructor*, in Germany.

57. *hadrocerus*, Thoms.

Hemiteles hadrocerus, Thoms. O. E. x. 991; Schm. Term. Füz. 1897, p. 548, ♂ ♀; cf. Bridg. Trans. Norf. Soc. 1889, p. 64.

A bright red species with black head, tricoloured antennae and fasciated wings. Frons finely alutaceous; apex of clypeus with a small, sub-quadrate lamina. Antennae elongate and somewhat stout, with the scape sub-globose and excised, pedicellus not internally produced; of ♀ tricoloured with a white central band. Thorax of ♀ testaceous, of ♂ black; mesonotum finely alutaceous, dull and densely pubescent, with mesopleurae not striolate; metathorax smooth and shining with the petiolar area not reaching the centre; areola elongate, emitting the costulae from before its centre; lateral costae distinct. Abdomen rufo-testaceous, of ♂ with the base and apex black; second segment smooth, and the central epipleurae acute; terebra a little longer than the narrow basal segment. Legs red, of ♂ partly black; claws not stout. Wings broadly fasciated with the areolet sub-entire; fenestrae confluent and not large; discoidal cell apically longer than broad, its lower angle acute and emitting the parallel nerve below the centre; nervellus intercepted and post-furcal. Length, 4-5 mm.

Closely allied to *H. micator* in its intercepted nervellus, etc., but distinguished therefrom by its simple pedicellus.

The only British record of which I am aware is that of a female taken by Bridgman, at Earlham near Norwich, in July, 1889; he says it is the handsomest species of the genus. On the Continent it ranges from Sweden to Germany, but has not yet been bred.

58. *minutus*, Bridg.

Hemiteles minutus, Bridg. Trans. Ent. Soc. 1886, p. 340; Schm. Term. Füz. 1897, p. 545, ♂ ♀.

A very smooth and shining black species of small size. Head sub-quadrate, rather narrower than the thorax; face quadrate and sub-prominent; clypeus hardly discreted. Antennae a little shorter than the body; scape somewhat longer than broad, externally notched; flagellum sub-filiform, basally attenuate, with the first joint four times longer than broad. Thorax longer than high; notauli anteriorly distinct; mesonotum very finely pubescent and sub-obsolete punctate; metathorax transverse with two distinct transverse costae; areola constricted behind, slightly broader than long and obsolete punctate; petiolar area discreted. Abdomen ovate, slightly broader than the thorax, glabrous and nitidulous; black with sometimes the second segment piceous; basal segment slender, with the post-petiole hardly broader and distinctly aciculate; spiracles not very prominent, just beyond the centre; following segments transverse; terebra about as long as the first segment. Legs very slender, black, with the front femora, tibiae and tarsi partly, and sometimes the hind tibiae at apex and before base, piceous. Wings slightly clouded, with the nervures pale and apically incomplete; areolet externally wanting; tegulae piceous, stigma infusate and more or less pale basally; lower outer angle of the discoidal cell sub-acute; nervellus opposite and not intercepted. Length, $2-2\frac{1}{2}$ mm.

The ♂ has the antennae more filiform and the abdomen more cylindrical, and the three basal segments coriaceous with the petiole bicarinate. Bridgman says that the species appears to be allied to *H. gracilis*, Thoms.

The original specimens were bred by W. H. B. Fletcher from spiders' nests, taken at Worthing, which swarm on the coast. I possess both sexes from Dr. Capron's collection, together with a female variety having the post-petiole distinctly explanate, the areola strongly transverse and the second recurrent nervure of the upper wing wanting.

59. *gracilis*, Thoms.

Hemiteles gracilis, Thoms. O. E. x. 989; Schm. Term. Füz. 1897, p. 546, ♂ ♀.

A slender, shining species with red abdomen. Head obsoletely punctate with the vertex somewhat broad; clypeus sub-compressed, mandibles not stout. Antennae basally and beneath pale, with the scape sub-globose and excised. Mesonotum nitidulous with distinct notauli; metathorax shining and somewhat smooth with complete costae; areola hexagonal, apically truncate, basally contracted; apophyses wanting. Abdomen glabrous and nitidulous, more or less discally fulvous; basal segment aciculate or coriaceous, usually strongly bicarinate throughout; petiolar spiracles behind the centre, second segment with epipleurae obtuse; terebra almost shorter than the narrow petiole. Legs pale. Wings hyaline; radial nervure elongate, basally emitted from the centre of the pale stigma; discoidal cell apically longer than broad, with its lower angle nearly rectangular and emitting the median nervure from below its centre; nervellus strongly post-furcal and not intercepted. Length, 3-4 mm.

This species is very closely allied to *H. micator*, with which Bridgman confused it, but it differs in having the nervellus not intercepted and the pedicellus mutic.

It was first recorded, without locality (Trans. Ent. Soc. 1886, p. 340), from Britain, on Professor Thomson's authority; subsequently Bridgman tells us that he took the specimens commonly in Norfolk, at Brundall and Norwich, and that it has been bred from spiders' nests. Bignell has captured it at Bickleigh and Plympton in Devon, in September; and there is a long series of females in Capron's collection from Surrey. Col. Yerbury has given it to me from Nairn, in July; Tuck several from Tostock in Suffolk, early in September, 1900; and I took a male at Hickling Broad in the following June.

60. *micator*, Grav.

Hemiteles micator, Gr. I. E. ii. 832, excl. ♂; Tasch. Zeits. Ges. Nat. 1865, p. 122, ♀; Thoms. O. E. x 990, ♂ ♀.

A small and strongly nitidulous species. Head with the palpi and mandibles stramineous. Antennae elongate, filiform; of ♀ with the excised and sub-globose scape more or less, and usually the flagellum, rufescent beneath; the joints not apically nodulose, pedicellus distinctly dentate internally. Thorax black or obscurely badious, with distinct and elongate notauli; metathorax coarsely rugose with costae and apophyses strong. Abdomen elliptic with the second, usually third and very rarely

fourth and fifth, segments discally testaceous ; basal segment sub-linear, a little dilated towards the apex, where it is less than half the breadth of its total length ; petiole slender, post-petiole parallel-sided, smooth and bicarinate with prominent spiracles ; terebra longer than first segment. Legs slender, testaceous ; hind ones partly black, with their coxae sometimes infusate above ; ♂ with all coxae and trochanters black. Wings sub-hyaline ; stigma and costa dull stramineous, radix and tegulae pale ; discoidal cell apically longer than broad, with its lower angle sub-acute ; nervelet wanting, nervellus intercepted. Length, 3-5 mm.

Gravenhorst mentions a ♀ variety with the abdomen entirely fusco-piceous, the antennae black throughout and only $2\frac{1}{2}$ mm. in length.

Thomson says the shining and smoothish head and mesonotum, elevated lateral metathoracic costae, sub-infumate wings, basally broadly white stigma, red legs with hind tarsi and apices of their tibiae and of their femora black, will distinguish this species, the ♂ of which has the antennae, tegulae, coxae and trochanters, black. The dentate pedicellus is peculiar to the species.

It is said to be distributed throughout Europe, but if the dentation of the pedicellus be constant, I can safely say I have never seen an example yet. It is, however, recorded from Yorkshire (Marshall) ; Hastings district (List) ; Bickleigh and Hartley in Devon, in September (Bignell) ; Maldon in Essex (Fitch).

61. *subannulatus*, Bridg.

Hemiteles subannulatus, Bridg. Trans. Ent. Soc. 1883, p. 147 ; Schm. Term. Füz. 1897, p. 547, ♀.

A dull, black, closely and finely punctate species. Head narrowed behind the eyes and anteriorly sub-triangular ; clypeus indistinctly discreted, epistoma slightly prominent, frons canaliculate. Antennae with first and second flagellar joints basally dull red, of equal length and about thrice longer than broad ; the fourth to seventh more or less annulated with white. Thorax with notauli distinct ; metathorax elongate, costae fine but distinct ; areola hexagonal, about twice longer than broad and apically sub-explanate ; petiolar area distinctly defined basally and discreted ; apophyses distinct. Scutellum with basal depression finely aciculate. Abdomen elongate, ovate ; black with segments two to four and apex of first castaneous, third and fourth laterally infusate and anus pale ; basal segment bicarinate, gradually explanate throughout, rather longer than twice its apical breadth with spiracles obsolete ; post-petiole ovally foveate ; segments two and three of equal length, the latter twice broader than long ; terebra about one-third length of abdomen. Legs slender, pale castaneous. Wings hyaline, with a transverse indeterminate fascia below the piceus and apically white stigma ; radix flavidous ; areolet transverse, pentagonal, emitting recurrent nervure before its centre ; second recurrent of lower wing sub-opposite, emitting nervellus distinctly below centre. Length, 5 mm.

The original specimens were taken in the neighbourhood of Shere by Dr. Capron and are now in my collection ; it was subsequently found at Earham near Norwich, in September, by Bridgman ; and bred from *Gelechia mulinella* by W. Fletcher. It is still unknown on the Continent.

62. *melanopygus*, Grav.

Hemiteles melanopygus, Gr. I. E. ii. 835; Tasch. Zeits. Ges. Nat. 1865, p. 125; Schm. Term. Füz. 1897, p. 530, ♀.

Head black, with the palpi red. Antennae red, becoming black towards the incrassate apices. Thorax black, with the pro- and meta-thorax sometimes dorsally castaneous; metathorax somewhat smooth, with the costae and apophyses distinct. Abdomen finely punctate, pale red, with the apex black, base of the first segment and apex of the third often infuscate, fourth mainly black and the last sub-testaceous; basal segment slender, slightly dilated gradually towards the apex, carinate, tuberculate and feebly aciculate; terebra about one-third of the length of the abdomen. Legs entirely pale red. Wings not clouded; radix and tegulae whitish; areolet regularly pentagonal with the outer nervure sub-obsolete. Length, 3-5 mm.

In outline it is said to be similar to *H. dubius*.

That this species ever occurred in Britain is extremely doubtful, since it is only known on the Continent from Silesia; however it must, at least for the present, be retained for it figures in both our 1870 and 1872 catalogues.

63. *anglicanus*, *sp. n.*

Head black, slightly transverse and nearly as broad as the eyes, obsoletely punctate with short, white pubescence; frons sub-convex, epistoma longitudinally bituberculate, cheeks buccate; clypeus apically deflexed and mutic, juxta-antennal orbits and the equidentate mandibles red. Antennae filiform, slightly attenuate basally, black, with the elongate-globose scape and whole flagellum red beneath; three basal flagellar joints apically sub-nodulose, the first two sub-equal in length, the third a little shorter. Thorax black, with the pronotum flavidous; mesonotum anteriorly, scutellum apically, mesopleurae and remainder of the prothorax red; mesonotum deplanate, centrally aciculate throughout, with elongate notauli; metathorax finely scabrous, areola wanting; basal costa distinct, strongly bisinuate and centrally acuminate at the obsolete basal area; apical costa also strong; petiolar area vertical, discreted and smoother; apophyses obsolete, spiracles small and circular. Abdomen parallel-sided, nitidulous, obsoletely punctulate with sparse white pubescence; black, with the second and third segments, except the apex of the latter, with apex of the first bright red; basal segment normally explanate and centrally sub-canaliculate apically, second and third with their apices slightly sub-callose; terebra one-third of the length of the abdomen. Legs clear red, with the front tibiae externally inflated; base of all the tibiae distinctly white; apical tarsal joint, centre and apices of the posterior tibiae, apices of the hind femora and of their tarsal joints, piceous. Wings hyaline, with a slight fascia beneath the piceous stigma; tegulae and radix stramineous, nervures piceous; areolet apically wanting; fenestrae broadly separated; nervellus sub-opposite, intercepted slightly below the centre. Length, 3-4 mm. ♀ only.

The red-marked thorax allies this species with *H. hadrocerus*, and the basally pure white tibiae with *H. pictipes*; but the black antennae, tri-coloured hind tibiae, flavidous pronotum and sub-glabrous post-petiole, render it abundantly distinct.

I swept the type of this species, which is in my collection, in Roydon Fen near Diss, in Norfolk, on 8th June, 1900; and I possess another example taken by Dr. Capron, presumably about Shere in Surrey.

64. *distinctus*, Bridg.

Hemiteles distinctus, Bridg. Trans. Ent. Soc. 1883, p. 151; Schm. Term. Füz. 1897, p. 549, ♀.

♀. Head transverse and finely reticulate; vertex sparsely pubescent; clypeus not distinctly reticulate, cheeks not buccate; face transverse with inner orbits parallel. Antennae slender, nearly length of body and apically sub-increasate; basal flagellar joint four times longer than broad, the following gradually decreasing in length with the ninth quadrate. Thorax finely reticulate, half as long again as high; metathorax with transverse costae not very distinct; petiolar area discreted. Abdomen sparsely pubescent, with segments two and three pale castaneous and laterally infusate; basal segment twice-and-half the length of its apical breadth; post-petiole longer than broad, double breadth of petiole, laterally sub-parallel, finely and distinctly aciculate, with spiracles not prominent and just behind centre; second segment sub-elongate and finely aciculate, with following transverse; terebra one fourth of abdomen. Legs slender, pale castaneous, with hind coxae basally piceous; hind femora with apical half, base and apex of their tibiae and all the tarsi, infusate. Wings with stigma and nervures piceous, radix flavidous, areolet pentagonal, nervelet wanting and nervellus sub-opposite and antefurcal. Length, 4 mm.

Bridgman says the structure of the metathorax, which is so poorly described, and the sculpture of the abdomen are very distinctive.

In coloration of the abdomen, antennal conformation and especially the striate second segment, it might be supposed to possibly constitute the opposite sex of *H. dissimilis*, Grav., but the discreted petiolar area, more finely sculptured metathorax with less complete costae and the colour of the legs will at once distinguish it. Moreover, I have myself found the true male.

♂. This sex differs from the female in having the antennae as long as the body, with base of first flagellar joint red; the metathorax sub-scabriculous, with areola not broader than long and apically truncate; the second and third segments are broadly infusate transversely before the apex as well as laterally; petiolar spiracles sub-prominent, intermediate femora piceous and nervelet indicated. Length, $3\frac{1}{2}$ mm.

Bignell took the original female at Exeter on 23rd September, 1882. I captured the typical male at Brandon in Suffolk, in a sandy place at the roots of *Senecio jacobaea*, on June 8th, 1903, and possess another kindly sent to me by Mr. E. A. Butler on September 1st, 1900, from Abinger Hammer in Surrey. It is unknown upon the Continent.

65. *validicornis*, *Thoms.*

Hemiteles validicornis, Thoms. O. E. x. 995 ; Schm. Term. Füz. 1897, p. 550, ♀.

Black. Frons shining and sub-glabrous, mandibles and palpi red. Antennae black, as long as the body ; of ♀ distinctly incrassate apically, with the basal half red ; of ♂ filiform throughout, and not incrassate ; pedicellus internally mutic. Mesonotum shining and nearly smooth ; metathorax nitidulous and sub-glabrous, with the costae strong and entire ; areola sub-circular, apophyses small. Abdomen glabrous and nitidulous, red with segments three to six, sides of the second and sometimes in ♀, always in ♂, first, black ; anus pale ; post-petiole aciculate and bicarinate, bordered throughout ; epipleurae of the second and third segments acutely inflexed ; terebra nearly as long as the first segment. Legs red, hind coxae of ♂ basally, and their tarsi, piceous. Wings with the lower angle of the discoidal cell not obtuse ; nervellus sub-opposite and intercepted below centre. Length, 4 mm.

Thomson, who leaves one uncertain as to the alar development, though Schmiedeknecht places it among the macropterous species, says it differs from *hemipterus*, *Esenbecki* and *pedestris* in the petiolar area reaching a little beyond the centre of the metanotum, the second segment with fine and scattered punctures and the front tibiae not inflated.

A specimen, or specimens of this Swedish species, taken at Eaton in Norfolk, in September, was named by Professor Thomson (recorded in Trans. Ent. Soc. 1886, p. 104), which Bridgman had considered to be *H. melanopygus*, Grav., nor could he afterwards detect wherein it differed from Gravenhorst's description. Schmiedeknecht relies upon the abdominal coloration. The male has not before been described ; both sexes are well represented in Capron's collection, probably from Shere in Surrey.

66. *politus*, *Bridg.*

Hemiteles politus, Bridg. Trans. Ent. Soc. 1883, p. 146 ; Schm. Term. Füz. 1897, p. 551, ♀.

A shining species, covered with very scattered, erect, stiff hairs. Head transverse, laterally rounded and posteriorly declived ; face transverse with inner orbits slightly emarginate next antennae ; epistoma sub-prominent ; clypeus distinctly discreted and apically broadly rounded. Antennae filiform and shorter than body ; scape not longer than broad ; flagellum basally, and to the centre beneath, red. Thorax longer than high and narrower than abdomen ; mesonotum slightly wrinkled with faint notauli ; upper metathoracic areae distinct ; areola longer than broad, hexagonal ; apophyses prominent, petiolar area sub-discreted. Abdomen broadest centrally, black, with second and base of third segment red ; basal segment gradually explanate throughout, sub-canaliculate and glabrous, with prominent spiracles, and the following segments transverse and glabrous ; terebra straight, two-thirds length of abdomen. Legs slender, red ; base of coxae sometimes infusate, apices of hind femora and base and apex of their tibiae nigrescent. Wings slightly infumate ; radix and base of the piceous stigma white ; areolet pentagonal with outer nervure wanting ; lower external angle of discoidal cell sub-acute ; nervellus interstitial, slightly post-furcal. Length, $3\frac{1}{2}$ –4 mm.

Bridgman says this species is very like *H. oxyphimus*, but the wings are not fasciated, the legs are more slender, the basal segment is narrower and not aciculate and the terebra is longer; it appears to differ from *H. validicornis* in nothing but its slender antennae and longer terebra.

Taken by Bignell at Exeter towards the end of September; by Marshall at Sandwich, Milford Haven and Braemar; by Canon Fowler; and by Dr. Capron at Shere. It appears to be generally distributed and is probably not uncommon, though at present unrecognized on the Continent.

OTACUSTES, Förster.

Först. Verh. pr. Rheinl. 1868, p. 174.

Head transverse and not globose. Metathoracic spiracles large and oblong. Second discoidal cell entire; areolet internally complete and regular, externally obsolete. Basal segment short and stout. Metathoracic costae entire and its basal sulcus deeply impressed.

The conformation of the metathoracic spiracles certainly appears to entitle the following species to generic rank. I have no personal acquaintance with this genus, which appears to be very doubtfully indigenous, but would suggest its possible relationship with *Plectrocryptus grisescens*, Grav., from which, however, it sufficiently differs in the elongate metanotum, sub-sessile abdomen and narrow stigma.

1. *breviventris*, Grav.

Hemiteles breviventris, Gr. I. E. ii. 789; Tasch. Zeits. Ges. Nat. 1865, p. 120; Schm. Term. Füz. 1897, p. 501, ♂.

Head black with the clypeus imperfectly discreted, apically reflexed, obtusely truncate and irregularly dentate. Antennae setiform, rufescent and somewhat shorter than the body. Thorax sub-cylindrical, black; metathorax elongate, closely and not finely punctate, with complete areae and deep basal sulcus; petiolar area oblique and discreted. Scutellum black. Abdomen nearly sessile, sub-sericeous, ovate, deplanate, as broad as the thorax, very closely and finely punctate, piceous; basal segment feebly canaliculate and basally gradually contracted, longer than broad, with the spiracles prominent; anal styles obtuse and hardly exerted. Legs normal, red; coxae and trochanters black; hind tarsi and apices of their tibiae infuscate. Wings clouded, stigma narrow and, like the costa, black; radix and tegulae whitish; areolet pentagonal with the outer nervure barely indicated. Length, 6 mm.

The abdomen is broader, with its basal segment shorter and broader, than in any species of *Hemiteles*; both Taschenberg and Schmiedeknecht thought it worthy of generic position, to which Förster had already raised it, though they merged it in the latter genus.

Only a single authentic specimen, which was captured in Germany, appears to be known; the British record rests upon its introduction by Marshall, with no details, in his 1870 and 1872 catalogues.

CECIDONOMUS, *Bridgman*.

Bridg. Entom. 1880, p. 264; cf. Fitch. *lib. cit.* p. 254; (?) *Diaglypta*, Först. Ver. pr. Rheinl. 1868, p. 176.

Head sub-cubical, dull and coriaceous; face pubescent and convex; mandibles as broad as length of cheeks. Antennae filiform, not longer than abdomen; pedicellus longer than scape and as long as the following joint. Thorax coriaceous, slightly longer than high; pronotum somewhat elongate; metathoracic areae more or less distinct, areola sub-pentagonal and emitting the costulae far from its base; spiracles circular, apophyses distinct. Abdomen as long as head and thorax, sub-petiolate, deplanate with the anus more or less distinctly compressed, and widest at apex of the second segment; basal segment bordered, basally bicarinate, strongly and evenly punctate, gradually explanate throughout with distinct spiracles; terebra rarely shorter than abdomen and very distinctly deflexed. Legs normally slender with the claws not pectinate; calcaria straight, red and not more than one-fourth the length of the metatarsus. Wings with areolet pentagonal or wanting; fenestra centrally corneous; lower angle of the discoidal cell acute.

This genus is rendered distinct by its very broad head and basal segment, sub-compressed anus and elongate terebra, as well as by its dull and coriaceous sculpture. It has strong *Pimplid* facies, and Kriechbaumer thought it allied in the structure of its head, antennae and metathorax with the *Xoridini*; Bridgman compares it with *Atractodes*, referring to the broad petiole, but he finally thought it most correctly placed between *Phygadeuon* and *Hemiteles*; indeed, he at first doubtfully included *Hemiteles inimicus*, and I am very certainly of opinion that this species is correctly here placed, and go so far as to have doubts whether *C. gallicola* be more than an immaculate variety of it. Dr. Capron, however, placed this genus in the *Ophioninae*, near *Cremastus*.

Both the original species have been bred from galls, where they were probably parasitic upon *Tortrices* or *Aculeate-Hymenoptera*, as also has *C. inimicus*.

As Schmiedeknecht truly says, further information respecting this "fast unbekannte und verschellene Gattung" is badly needed; it is unfortunate that Bridgman did not see fit to supplement his somewhat crude notes at a later date, but this omission I have to some extent been enabled to obviate.

Table of Species.

- | | | |
|------|--|-------------------------------|
| (4). | 1. Head sub-globose; terebra longer; ♂
pedicellus basally pale. | |
| (3). | 2. Nervellus intercepted below centre;
petiole punctate | 1. WESTONI, <i>Bridg.</i> |
| (2). | 3. Nervellus intercepted in centre; petiole
aciculate..... | 2. XYLONOMOIDES, <i>Morl.</i> |
| (1). | 4. Head sub-transverse; terebra shorter; ♂
pedicellus immaculate. | |
| (6). | 5. Abdomen of ♀ centrally red, of ♂ apically
deplanate | 3. INIMICUS, <i>Grav.</i> |
| (5). | 6. Abdomen black, of ♂ apically sub-com-
pressed | 4. GALLICOLA, <i>Bridg.</i> |

1. *Westoni*, Bridg.

Hemiteles punctatus, Ratz. Ichn. d. Forst. ii. 127, ♂ (?). *Cecidonomus Westoni*, Bridg. Entom. 1880, p. 264; Schm. Term. Füz. 1897, p. 561, ♂ ♀.

Head black, dull and coarsely coriaceous; face convex with dense griseous pubescence; cheeks and temples buccate; vertex very broad. Antennae about two-thirds the length of the body; filiform, with the basal joints ferrugineous beneath. Thorax black, coarsely coriaceous and pubescent throughout; notauli obsolete, though extending to the scutellar fovea; metathorax coarsely wrinkled with distinct upper areae; areola elongate-triangular, shorter in ♂, emitting the often wanting costulae beyond its centre. Scutellum short, dull and sub-deplanate. Abdomen black, coarsely, closely and evenly punctate throughout, and somewhat dull; terebra slightly longer than the abdomen. Legs red, with the apices of the intermediate tarsi darker; apices of the hind femora and tarsi, with more or less of their spinulose tibiae, infusate; ♂ with coxae, except the apices of the anterior, black. Wings hyaline; areolet pentagonal, a little produced internally; nervellus post-furcal and intercepted slightly below the centre. Length, 4-6 mm.

I have seen both sexes with the basal incisures more or less rufescent.

Mr. Weston bred fifteen males and nine females from galls of *Cynips Kollari* in 1878-9. It is not an uncommon species in Britain, though not yet recognized on the Continent. Maldon in Essex (Fitch); several at Shere (Capron); Greenings, Surrey, in June (W. Saunders). Tuck has given me two females which he captured at Tostock in Suffolk, on 20th July, 1900; and I took others on the window of Monks' Soham House, on 5th August, 1905.

2. *xylonomoides*, sp. n.

Head black and rugosely coriaceous, very strongly buccate, with the frons convex and temples sub-intumescent above the eyes. Antennae sub-filiform and about two-thirds the length of the body. Thorax roughly coriaceous; mesonotum discally deplanate, with notauli deeply impressed though not sharply defined, anteriorly prominent and sharply declived; metathoracic areae indistinct though traceable, areola elongate-triangular, with its apex truncated by the strong transverse ridge. Scutellum short, dull and sub-deplanate. Abdomen sub-cylindrical, dull, pubescent and distinctly punctate, with the two basal segments sub-strigose and all the incisures red. Legs pubescent, black, with the tibiae except the infusate apices of the posterior, and the base of the front tarsi, testaceous. Wings hyaline; stigma piceous with whitish base, radix stramineous; areolet pentagonal, a little produced internally, with the outer nervure sub-obsolete; nervellus sub-opposite and intercepted centrally. Length, 5 mm. ♂ only.

This species is very closely allied with the ♂ of *C. Westoni*, from which the more intumescent head and mesonotum, weaker metathoracic areae, pale tibiae and slightly more strongly produced areolet will serve to distinguish it. These points and the stout transverse metathoracic ridge give it stronger *Pimplid* facies than is presented by either of Bridgman's species. The petiole, too, is slightly less contracted basally.

I have seen but two examples of this anomalous species. I captured the type on a very hot day in the Bentley Woods, near Ipswich, on 27th May, 1900; and Wilson Saunders took a specimen, several years ago, probably at Greenings near East Grinstead, though no locality is attached.

3. *inimicus*, Grav.

Hemiteles inimicus, Gr. I. E. ii. 824; Tasch. Zeits. Ges. Nat. 1865, p. 132, ♀; Thoms. O. E. x. 970, ♂ ♀. *Cecidonomus rufus*, Bridg. Entom. 1880, p. 265, ♀; cf. lib. cit. 1883, p. 155; Schm. Term. Füz. 1897, p. 562, ♀.

Head with the vertex somewhat broad and not narrowed posteriorly; palpi, and in ♀ sometimes the centre of the mandibles, red; clypeus incompletely discreted with two apical central teeth; mandibles not tuberculate, cheeks buccate; frons dull, densely and very finely pubescent; ♂ face strongly pilose, and a broad basal mandibular mark, white. Antennae black, slender, filiform and nearly as long as the body; of ♂ shorter, with the scape clear white beneath. Thorax finely alutaceous; pronotum with no central carina; mesonotum dull, densely and very finely pubescent, with the notauli obsolete; metathoracic areae entire, areola pentagonal or hexagonal, hardly longer than broad and basally constricted, of ♂ sub-transverse; metapleurae nitidulous, petiolar area discreted, apophyses small. Abdomen oblong-ovate, as broad as the thorax, of ♀ apically sub compressed; black, of ♀ with the second segment, more or less of the first apically and generally the basal half of the third segments, red, the two apical segments more or less distinctly white-margined; of ♂ with the incisures sometimes castaneous; basal segment sub-canaliculate and obsoletely aciculate, with the petiole short, bicarinate, and the post-petiole hardly longer than broad, though twice broader than the petiole; second segment finely and evenly punctate or, in ♂, sub-rugosely punctulate and somewhat elevated centrally at the apex; terebra as long as the abdomen and distinctly deflexed. Legs normal; red with the hind tibiae not white-banded but generally apically, like their tarsi, infusate; ♂ with the hind coxae black, the anterior and all the trochanters white. Wings hardly clouded; stigma piceous and hardly paler basally, radix and often tegulae white, areolet wanting, nervellus distinctly antefurcal. Length, 4-6 mm.

Taschenberg says that the ♀ is very like *Hemiteles castaneus*, but the areola is decidedly narrow basally, the post-petiole parallel-sided with a shallow furrow, antennae unicolorous and clypeus only sub-discreted. Brischke calls attention (Entom. 1880, p. 255) to its resemblance with *H. monospilus*, Grav.; and Thomson points out that the female may be known by its slender antennae, which continue black towards the base, the confluent fenestrae, terebra nearly the length of the apically compressed abdomen and by its coloration. The ♂ is distinct in its short, stout, sub-setaceous antennae, and in having the abdomen nearly totally black.

Mr. Weston bred three females from the galls of *Cynips Kollari*, where perhaps it was parasitic upon inquiline *Aculeata*, in 1878-9; and two more of the same sex were captured by Bridgman near Norwich; it occurs in June. Eaton and Earlharn in Norfolk (Bridgman); bred in Devon, on 14th April, from an unknown host (Bignell); Maldon in Essex (Fitch); Dr. Capron took it commonly at Shere, Wilson Saunders at Reigate in

July, 1872; and I have found it by sweeping hedges at Monk Park Wood in Suffolk, and in Burwell Fen in Cambs., in May and June. On 13th June, 1900, I took a female on a house window at Great Bradley in Suffolk, which is unlike any *Hemiteles* described by Schmiedeknecht, and I conclude must be a small form of the present species, from which it differs only in its glabrous, entirely black abdomen and testaceous stigma.

4. *gallicola*, Bridg.

Cecidonomus gallicola, Bridg. Entom. 1880, p. 265; Schm. Term. Füz. 1897, p. 562, ♂ ♀.

A black species with the head dull and finely coriaceous; face pubescent and vertex hardly narrowed posteriorly; mandibles and palpi flavous. Antennae about two-thirds the length of the body. Thorax dull and finely coriaceous; mesonotum discally deplanate with the notauli hardly indicated; metathorax somewhat shining with the areae not very distinct; areola somewhat regularly hexagonal, sub-transverse, basally incomplete and hardly constricted, of ♂ not broader than long and more regular, apically truncate; petiolar area excavate. Abdomen with the three basal segments dull and finely alutaceo-punctate, the remainder sub-compressed and glabrous; terebra hardly longer than the abdomen. Legs red; of ♀ with coxae and trochanters, apices of the hind tibiae and tarsi sometimes, infusate; of ♂ with coxae except the apices of the anterior, and base of the posterior trochanters, infusate. Wings with the areolet externally wanting; stigma piceous, radix and tegulae flavous; nervellus intercepted below the centre. Length, 4-6 mm.

Bridgman says the finer sculpture and nitidulous anus will distinguish this species, as also do the much less cubical head, shorter terebra and the sometimes dark ♀ coxae and trochanters. Brischke thought it allied to *Hemiteles coriarius*, Tasch.

Two males and four females bred from the galls of *Cynips Kollari* in 1878-9, and three males captured at Norwich; also found at Maldon in Essex, Shere in Surrey, Felden in Herts.; and I have taken two males in a greenhouse at Ryde, in the Isle of Wight, in August.

PEZOMACHOIDES.

Table of Genera.

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|------|----|--|-----------------------|
| (2). | 1. | Head transverse; metanotum as long as petiolar area, central segments normal | PEZOMACHUS, Grav. |
| (1). | 2. | Head sub-globose; metanotum shorter than petiolar area, central segments connate | THAUMATOTYPUS, Först. |

PEZOMACHUS, Gravenhorst.

Gr. I. E. ii. (1829), 867.

Head transverse and not narrower than thorax, with the cheeks often sulcate. Antennae of ♀ not very slender. Thorax sub-cylindrical; metanotal areae usually entirely wanting, usually only the apical transverse costa distinct, areola of ♂ sometimes indicated though not divided from

the basal area. Scutellum of ♀ not discreted from the mesonotum and usually entirely wanting. Terebra not shorter than half the basally constricted first segment. Penultimate tarsal joint not deeply incised nor bilobed. Female apterous; ♂ apterous, brachypterous or macropterous; wings, when macropterous, with the basal nervure strongly curved and usually with the stigma very broad.

The entirely apterous females and males, or, when the latter are winged, their curved basal nervure, will distinguish this group of species from the very closely allied *Hemiteles*, among which some of the unassociated ♂ ♂ may be referable to the present group, since both Gravenhorst and Förster were of the opinion that their males were, like the females, always entirely apterous or with no more than the minutest vestiges of wings.

In 1878 Bridgman wrote, "There is a genus concerning which information is much wanted; that is the apterous little Cryptids of the genus *Pezomachus*, which greatly resemble ants" (Entom. p. 35). The information referred to was mainly in the association of the sexes and in the synonymy. It has been acknowledged on all hands that Gravenhorst erected too few species, considering (very wisely) that it were better to treat slight divergences of structure and especially colour as mere varieties; and that Förster on the other hand (very foolishly) described as distinct every traceable difference of every sort. The result of the latter method has been the crowding of catalogues with "names," many of which differ from each other in trivial and quite immaterial points. In 1870, Marshall had to record thirty-five British kinds; in 1872, the total had risen to forty-eight "species"; and in 1883, Bridg.-Fitch enumerated sixty-one. When compiling my total for the Entomological Society in March, 1901, I had to bring forward twenty-nine more, thus showing ninety of Förster's 158 species, with a few of Thomson's and Bridgman's, from our Islands. The strange thing is that no one ever attempted to synonymize Förster's trivialities, except Thomson, who, in 1884, found several to be alike. It has consequently devolved upon me to reduce the great mass as far as is consistent with the specific characters, among which it is very difficult to determine which are constant (for I am persuaded the development of the scutellum and continuity of the abdominal pubescence is dependent on larval nourishment), and the great divergence of the sexes.

In this I have been very greatly aided by Mr. E. A. Elliott, who has placed in easily comparative form the whole of the European females, and who has studied the genus for the last seven years. Even he, however, quite failed to recognize characters sufficiently valid to compose a table of the species. Förster divided them primarily upon the presence or absence of the transverse metathoracic carina, taking the apophyses to indicate a ridge in such cases as might be ascribed to either, but he himself has introduced many exceptions to this rule, and the development of this carina is very variable and a most unsatisfactory feature, as also is the approximation of the puncturation, another point upon which he much relies. It became essential, therefore, to promulgate a new scheme of specific distinction; and this was tentatively outlined in the E.M.M. 1900, p. 147, having the length of the antennae, of their individual joints, the sculpture of the abdomen, the presence of the scutellum and conformation of the basal segment as its primary points. Of these it was found impossible to employ the relative length of the antennae, though that of their joints is

one of the most constant and most obvious features of these insects ; the basal segment was found to vary considerably in shape in individuals of the same species, and the scutellum to depend too much on individual development to be reliable. The acetabulae, the hollows in which the coxae revolve, have been denoted by Thomson, together with the inflection or continuity of the genal costa ; but these features are rarely to be examined in our carded specimens, and have been but little employed in the following tables, which it is hoped will serve to elucidate this difficult genus till better can be compiled.

Sub-genera might, with propriety, be erected, based on the very distinct shapes exhibited by the basal flagellar joints, sometimes moniliform, sometimes strongly elongate with and without their apices nodulose. This is impossible in the present work, as no reference to their shape is made by the older authors.

In Beaumont's collection (now *in mus.* Chitty) I have seen British specimens purporting to represent *P. vorax*, Först., from Harting in Sussex, and *P. proditor*, with *P. ambulans*, Först., from Appledore in Kent ; these I was not then in a position to confirm and—since their captor often declared he “never opened a book !”—I have here ignored. Richardson has bred unspecified *Pezomachi* from *Coleophora flaviginella* and *Nepticula centifoliella* at Weymouth ; and others are mentioned at Ent. Annual, 1860, p. 44, and 1861, pp. 40-41, and E.M.M. 1872, pp. 162 and 180 ; cf. also Brischke's Kürzere Mittheilungen über die Gattung *Pezomachus* (Schr. Nat. Ges. Danz. 1877-78), and my paper on the genus (Trans. Leicester Phil. Soc. 1899, pp. 295-301). To illustrate how little reliance should be placed upon Förster's “species,” it is only necessary to add that he described a hundred and two of them from a single specimen only.

Schmiedeknecht in 1906 adds nothing whatever to our knowledge of the genus nor its classification.

Table of the Females.

(14).	1. Basal flagellar joint shorter than the second.	
(13).	2. Fifth flagellar joint not shorter than broad.	
(10).	3. Fifth flagellar joint quadrate.	
(9).	4. Abdomen not closely nor uniformly punctate.	
(8).	5. Clypeus apically immarginate ; interstices glabrous.	
(7).	6. Apophyses wanting ; central segments elongate	1. SYLVICOLA, Först.
(6).	7. Apophyses distinct ; central segments transverse	2. AQUISGRANENSIS, Först.
(5).	8. Clypeus apically margined ; interstices alutaceous	3. KIESENWETTERI, Först.
(4).	9. Abdomen closely and uniformly punctate	4. ZONATUS, Först.
(3).	10. Fifth flagellar joint longer than broad.	
(12).	11. Abdomen distinctly punctate ; central segments callose	5. VULPINUS, Grav.
(11).	12. Abdomen obsoletely punctate ; central segments normal	6. COSTATUS, Bridg.

- (2). 13. Fifth flagellar joint shorter than broad 7. *RUFIPES*, *Först.*
- (1). 14. Basal flagellar joint not shorter than the second.
- (62). 15. Two basal flagellar joints of equal length.
- (29). 16. Fifth flagellar joint quadrate.
- (22). 17. Abdomen closely punctate throughout.
- (19). 18. Metathoracic costa centrally obsolete 8. *CAUTUS*, *Först.*
- (18). 19. Metathoracic costa strong throughout.
- (21). 20. Red ; thorax short 9. *AEMULUS*, *Först.*
- (20). 21. Black ; thorax of normal length ... 10. *VULNERANS*, *Först.*
- (17). 22. Abdomen diffusely punctate.
- (26). 23. Metathorax longitudinally excavate.
- (25). 24. Prothorax and central segments red 11. *CANALICULATUS*, *Först.*
- (24). 25. Prothorax and central segments black 12. *PILOSUS*, *Capron.*
- (23). 26. Metathorax not longitudinally excavate.
- (28). 27. Genal costa inflexed ; post-petiole longer than broad..... 13. *ACARORUM*, *Linn.*
- (27). 28. Genal costa continuous ; post-petiole sub-transverse..... 14. *MANDIBULARIS*, *Thoms.*
- (16). 29. Fifth flagellar joint longer than broad.
- (57). 30. Fifth flagellar joint less than twice longer than broad.
- (48). 31. Abdomen densely punctate and pubescent throughout.
- (39). 32. Thorax comparatively short.
- (34). 33. Metanotum shorter than mesothorax ; antennae elongate..... 15. *FESTINANS*, *Grav.*
- (33). 34. Metanotum and mesothorax of equal length.
- (36). 35. Segments strongly transverse, second and third very short..... 16. *HIERACII*, *Bridg.*
- (35). 36. Segments not strongly transverse, central normal.
- (38). 37. Petiolar area oblique ; post-petiole longer than broad..... 17. *NIGRITUS*, *Först.*
- (37). 38. Petiolar area sub-vertical ; post-petiole transverse..... 18. *SPINULUS*, *Thoms.*
- (32). 39. Thorax not comparatively short.
- (47). 40. Thorax of normal length.
- (44). 41. Metanotum shorter than mesothorax.
- (43). 42. Meso-double length of meta-notum ; petiolar area large 19. *TENER*, *Först.*
- (42). 43. Meso- slightly longer than meta-notum ; petiolar area normal ... 20. *MICRURUS*, *Först.*
- (41). 44. Metanotum and mesothorax of equal length.
- (46). 45. Mesonotum deeply impressed ; basal segment elongate 21. *FORMICARIUS*, *Fab.*
- (45). 46. Mesonotum not impressed ; basal segment broad 22. *MÜLLERI*, *Först.*

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| (40). | 47. | Thorax elongate | 23. | VAGANTIFORMIS, <i>Bridg.</i> |
| (31). | 48. | Abdomen not densely punctate and pubescent throughout. | | |
| (54). | 49. | Abdomen basally closely, apically more diffusely, punctate. | | |
| (51). | 50. | Petiolar area basally truncate | 24. | DISTINCTUS, <i>Först.</i> |
| (50). | 51. | Petiolar area basally curvate. | | |
| (53). | 52. | Post-petiole normal ; petiolar area sub-vertical | 25. | ANALIS, <i>Först.</i> |
| (52). | 53. | Post-petiole broad ; petiolar area oblique | 26. | ATTENTUS, <i>Först.</i> |
| (49). | 54. | Abdomen diffusely punctate and pubescent throughout. | | |
| (56). | 55. | Vertex emarginate ; meta- and meso-thorax of equal length | 27. | TONSUS, <i>Först.</i> |
| (55). | 56. | Vertex entire ; meta- much shorter than meso-notum | 28. | PUMILUS, <i>Först.</i> |
| (30). | 57. | Fifth flagellar joint fully twice longer than broad. | | |
| (61). | 58. | Abdomen closely punctate and pubescent throughout ; thorax elongate. | | |
| (60). | 59. | Thorax centrally constricted ; metanotum gibbous..... | 29. | GONATOPINUS, <i>Thoms.</i> |
| (59). | 60. | Thorax not constricted ; metanotum narrower than mesothorax | 30. | ANTHRACINUS, <i>Först.</i> |
| (58). | 61. | Abdomen diffusely punctate and pubescent ; thorax normal..... | 31. | INTERMEDIUS, <i>Först.</i> |
| (15). | 62. | Basal flagellar joint longer than second. | 31. | VAGANS, <i>Oliv.</i> |
| (66). | 63. | Fifth flagellar joint quadrate. | | |
| (65). | 64. | Abdomen closely punctate ; post-petiole apically broad | 32. | FRAUDULENTUS, <i>Först.</i> |
| (64). | 65. | Abdomen diffusely punctate ; post-petiole apically narrow | 33. | IMPOTENS, <i>Först.</i> |
| (63). | 66. | Fifth flagellar joint longer than broad. | | |
| (102). | 67. | Fifth flagellar joint less than twice longer than broad. | | |
| (85). | 68. | Abdomen closely punctate and pubescent throughout. | | |
| (70). | 69. | Thorax short | 34. | TIMIDUS, <i>Först.</i> |
| (69). | 70. | Thorax not short. | | |
| (84). | 71. | Thorax of normal length. | | |
| (75). | 72. | Meso- and meta-notum of equal length ; petiolar area sub-vertical. | | |
| (74). | 73. | Scutellum distinct ; post-petiole laterally divergent | 35. | BICOLOR, <i>Grav.</i> |
| (73). | 74. | Scutellum wanting ; post-petiole parallel-sided..... | 36. | OCHRACEUS, <i>Först.</i> |
| (72). | 75. | Meta- longer than meso-notum. | | |
| (77). | 76. | Metathorax narrow and laterally compressed | 37. | MODESTUS, <i>Först.</i> |
| (76). | 77. | Metathorax normal. | | |
| (79). | 78. | Mesonotum transverse | 38. | AGILIS, <i>Grav.</i> |
| (78). | 79. | Mesonotum not transverse. | | |
| (83). | 80. | Petiolar area short and sub-vertical. | | |
| (82). | 81. | Antennae and first segment short ; post-petiole very broad | 39. | PULICARIUS, <i>Fab.</i> |

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| (81). | 82. Antennae and abdomen normal ... | 40. TRISTIS, <i>Först.</i> |
| (80). | 83. Petiolar area normal and oblique... | 41. CARNIFEX, <i>Först.</i> |
| (71). | 84. Thorax elongate | 42. NIGRICORNIS, <i>Först.</i> |
| (68). | 85. Abdomen not closely punctate and pubescent throughout. | |
| (87). | 86. Abdomen basally closely, apically diffusely, punctate | 43. CORRUPTOR, <i>Först.</i> |
| (86). | 87. Abdomen diffusely punctate and pubescent throughout. | |
| (89). | 88. Head not broader than thorax | 44. GRACILIS, <i>Först.</i> |
| (88). | 89. Head broader than thorax. | |
| (91). | 90. Thorax very short and head very broad | 45. BREVIS, <i>Bridg.</i> |
| (90). | 91. Thorax and head normal. | |
| (97). | 92. Abdomen strongly alutaceous, punctures very distinct. | |
| (94). | 93. Basal segment with tubercles central and very prominent | 46. STEVENI, <i>Grav.</i> |
| (93). | 94. Basal segment with tubercles beyond centre and sub-obsolete. | |
| (96). | 95. Antennae and thorax elongate | 47. INSTABILIS, <i>Först.</i> |
| (95). | 96. Antennae and thorax short | 48. FÖRSTERI, <i>Bridg.</i> |
| (92). | 97. Abdomen not strongly alutaceous nor distinctly punctate. | |
| (99). | 98. Mesonotum triangular; petiolar area basally contracted | 49. CURSITANS, <i>Grav.</i> |
| (98). | 99. Mesonotum normal; petiolar area not contracted. | |
| (101). | 100. Petiolar area vertical; meta- and meso-notum equally long | 50. DETRITUS, <i>Först.</i> |
| (100). | 101. Petiolar area oblique; meta- shorter than meso-notum | 51. PEDICULARIUS, <i>Fab.</i> |
| (67). | 102. Fifth flagellar joint twice longer than broad. | |
| (104). | 103. Abdomen closely punctate and pubescent | 52. COMES, <i>Först.</i> |
| (103). | 104. Abdomen diffusely punctate and pubescent. | |
| (106). | 105. Meta- and meso-notum of equal length; third segment fasciated | 53. FASCIATUS, <i>Fab.</i> |
| (105). | 106. Meta- longer than meso-notum. | |
| (108). | 107. Petiolar tubercles prominent; sternum red | 54. PALPATOR, <i>Grav.</i> |
| (107). | 108. Petiolar tubercles obsolete; sternum black | 55. GEOCHARES, <i>Först.</i> |

A Guide to the Males.

Apterous.

Abdomen broadly pale centrally.

Abdomen closely punctate.

Coxae infuscate.

Basal segment broad and explanate

Basal segment sub-linear and

narrow

34. FUSCULUS, *Först.*

39. LUSTRATOR, *Först.*

Coxae red.

Hind femora apically black

40. VIOLENTUS, *Först.*

Legs entirely red.

Mesonotum red.

Metanotum piceous

36. PROCURSORIUS, *Först.*

Metanotum red

43. DYSALOTUS, *Först.*

- Mesonotum black.
 Post-petiole parallel-sided ... 41. SUBTILIS, *Först.*
 Post-petiole explanate 37. AGELETES, *Först.*
 Abdomen diffusely punctate.
 Mesonotum red.
 Hind femora piceous..... 13. AVIDUS, *Först.*
 Hind femora red 27. TONSUS.
 Mesonotum black.
 Metathoracic costa normal 49. ELAPHRUS, *Först.*
 Metathoracic costa centrally de-
 planate 58. INDAGATOR, *Först.*
 Abdomen not broadly pale centrally.
 Metathoracic costa wanting; body
 linear.
 Tarsi piceous 16. LINEARIS, *Först.*
 Tarsi red 29. GONATOPINUS.
 Metathoracic costa distinct; body
 fusiform.
 Abdomen glabrous 18. SPINULUS.
 Abdomen sparsely punctate..... 28. PUMILUS.
 Abdomen closely punctate.
 Petiole and legs stout 20. MICRURUS.
 Petiole and legs slender 56. ANGUINUS, *Först.*
 Brachypterous.
 Abdomen entirely black 15. OCISSIMUS, *Först.*
 Abdomen centrally pale.
 Antennae red 38. AGILIS.
 Antennae black 54. PALPATOR.
 Macropterous.
 Abdomen not broadly pale centrally.
 Nervellus obsolete 30. ANTHRACINUS.
 Nervellus post-furcal 42. PICEUS, *Bridg.*
 Nervellus opposite..... 25. ANALIS.
 Nervellus antefurcal.
 Stigma broad.
 Second segment black 3. KIESENWETTERI.
 Second segment pale-marked 17. NIGRITUS.
 Stigma not broad.
 Antennae slender; areola distinct 47. RUFOCINCTUS, *Ratz.*
 Antennae stout; areola indistinct.
 Abdomen rugosely punctate ... 7. MELANOPHORUS, *Först.*
 Abdomen evenly punctate 1. SYLVICOLA.
 Abdomen broadly pale centrally.
 Nervellus opposite.
 Stigma broad 49. VARIABILIS, *Ratz.*
 Stigma not broad.
 Pronotum and petiole black.
 Mesonotum foveate 31. VAGANS.
 Mesonotum entire 53. LUTEIVENTRIS, *Grav.*
 Pronotum and petiole testaceous.
 Second segment elongate..... 14. MANDIBULARIS.
 Second segment of normal length 41. ANNULICORNIS, *Bridg.*
 Nervellus antefurcal.
 Wings short; basal nervure sub-
 vertical 2. AQUISGRANENSIS.
 Wings normal; basal nervure oblique.
 Prothorax red.
 Areola entire 4. ZONATUS.
 Areola laterally wanting 8. RUFIPES, *Bridg. (nec Först.).*

Prothorax black.	
Hind tibiae mainly black	39. PULICARIUS.
Hind tibiae red.	
Hind coxae red.	
Wings distinctly bifasciated	51. PEDICULARIUS.
Wings not bifasciated.	
Notauli wanting	22. CONFUSUS, <i>Bridg.</i>
Notauli distinct.	
Notauli reaching scu- tellum	21. OVATUS, <i>Bridg.</i>
Notauli only reaching centre	57. HYPONOMEUTAE, <i>Bridg.</i>
Hind coxae black.	
Fenestra broadly discreted	52. COMES.
Fenestra not broadly dis- creted.	
Notauli wanting	54. PALPATOR.
Notauli not entirely wanting.	
Areola distinct	33. IMPOTENS.
Areola not distinct.	
Second segment dis- cally black	39. PULICARIUS.
Second segment en- tirely red	5. VULPINUS.

1. *sylicola*, Först.

Pezomachus sylicola, Först. Wieg. Arch. 1850, p. 134, ♀; Thoms. O. E. x. 1000, ♂ ♀; cf. Bridg. Trans. Ent. Soc. 1887, p. 365.

♀. Head strongly and closely punctate, dull and reticulate; oral costa not elevated; clypeus with deep basal foveae and shallow oblique lateral impressions, its apex centrally immarginate; cheeks much longer than basal width of mandibles, their sulcus wanting; red, with the broad vertex piceous, or mainly dark. Antennae stout, apically attenuate with the scape sub-cylindrical and apically hardly emarginate; basal flagellar joint shorter than the second and scarcely longer than the scape, the fifth quadrate; red, apically infuscate. Thorax rufo-testaceous, strongly and closely punctate and pubescent, dull; mesonotum not transverse, with distinct notauli, and as long as the metanotum; petiolar area centrally deeply impressed, its basal costa centrally wanting and laterally obsolete with small apophyses; pleurae striate. Scutellum wanting. Abdomen convex and not broad, with the basal three or four segments closely and distinctly punctate and nitidulous, the remainder densely reticulate and pubescent; incisures not deeply impressed; two basal segments large; petiole somewhat elongate, post-petiole not transverse and more strongly punctate with its apex not broad; spiracles of first segment small, of the second far from the margins; red, with a central black transverse band on the second and sometimes third segment, the remainder black, often with the fourth basally ferruginous; terebra varies in length from half, to nearly as long as, the basal segment. Legs stout, red; the front tibiae inflated, their calcaria long and stout; hind tibiae apically infuscate.

♂. Winged. Head black with the oral costa elevated. Antennae black, short, stout and apically attenuate; basal flagellar joint half as long again as the scape. Thorax black; metathorax distinctly, and sometimes

rugosely, punctate; areola and lateral costae indistinct, and the petiolar area elongate. Abdomen black, sometimes fasciated with red; fusiform-cylindrical, closely and evenly punctate throughout; spiracles of second segment close to the margins. Coxae black; femora and tibiae red, the latter sometimes basally or entirely black. Wings not large, with the basal nervure sub-vertical; stigma not broad, emitting the radius nearly from its centre, apical abscissa of the latter but little longer than the basal; nervellus strongly antefurcal. Length, 3-5 mm.

A very distinct species, differing from *P. myrmecinus*, Thoms., in the puncturation and colour of the abdomen, deplanate oral costa, etc.

In introducing this species as British (Trans. Ent. Soc. 1887, p. 365), Bridgman says, "Mr. G. C. Champion has taken a single female *Pezomachus*, which I believe to be this species, at Caterham." Mr. Albert Piffard has confirmed its claim to inclusion in our fauna by the capture of a female, which he has kindly presented to me, at Felden near Boxmoor, in Herts.

2. *aquisgranensis*, Först.

Pezomachus aquisgranensis, Först. Wieg. Arch. 1850, p. 117, ♀; Thoms. O. E. x. 1001, ♂ ♀. *P. quadrifasciatus*, Kriech. Ent. Nachr. xxv. p. 297, ♀. Var. *P. Neesii*, Först. Wieg. Arch. 1850, p. 118; Voll. Pinac. pl. xii. fig. 1, ♀; var. Bridg. Trans. Ent. Soc. 1887, p. 365, ♀.

♀. Head dull, somewhat finely, strongly and closely punctate; clypeus with deep basal foveae and shallow, oblique lateral impressions, its apex not margined centrally; genal sulcus wanting. Antennae stout and apically attenuate; basal flagellar joint shorter than the second and not longer than the sub-cylindrical scape; the fifth hardly longer than broad. Thorax with the meso- and meta-notum of equal length; petiolar area strongly excavate with the basal costa sub-obsolete and apophyses strong. Abdomen convex, strongly but only moderately and uniformly punctured throughout, with the pubescence somewhat elongate; basal segment with only slight tubercles, placed behind the centre; post-petiole not transverse, strongly punctate, with its lateral margins parallel and the apex not broad; the second with spiracles far from the margin and its apical incisure very distinct. Legs stout and calcaria long. Terebra either scarcely exerted or at least not more than half the length of the basal segment.

Head black, with palpi flavous and mandibles red. Antennae rufo-testaceous to their centre and thence piceous, with the scape darker. Thorax and abdomen red, the latter with transverse black bands, which do not reach the lateral margins, in the centre of the third, and nearer the base on the fourth and fifth, segments. Legs pale-red with the apical tarsal joint darker.

♂. Winged. Metathorax strongly rugose; areola and lateral costae indistinct; petiolar area long. Spiracles of the second segment not far from the lateral margin. Wings short; basal nervure nearly vertical; apex of the radius a little longer than the base; first recurrent antefurcal.

Head and thorax black. Abdomen with the first segment black, or red apically; second and third entirely red; the fourth black or with the base red. Femora red or with black markings; tibiae red and coxae black. Length, $3\frac{1}{2}$ -5 mm.

The typical form of the ♀ appears to have a transverse black mark nearly in the centre of segments three to five, not reaching the sides ; sometimes these are indistinct, reduced to spots or, more rarely, the third is almost entirely black and the second also black-marked, while the mark on the fifth is sometimes obsolete. The ♂ is similar to *P. vulpinus*, but the antennae are longer, the abdomen narrower and more strongly punctate.

The variety *Neesi* differs only in its less prominent apophyses, less parallel-sided post-petiole, and in having the whole abdomen from the second segment mainly piceous. Förster says its habitus and sculpture are exactly the same and the two stand apart. The sub-variety of Bridgman has the antennae twenty- (not twenty-two) jointed, with their base usually darker ; the basal segment alone is red, with the rest purplish-brown and the incisures faintly rufescent, and the terebra longer.

P. aquisgranensis appears to be very rare in Britain and I have heard of no records. The only examples I have seen are nine, which I took among *Myrmica ruginodis* and *M. scabrinodis* in long ground moss in the Bentley Woods, near Ipswich, on 23rd March, 1895, and one in the same locality and situation early in the following February. The variety *Neesi* has been taken by Piffard at Felden in Herts., Capron at Shere in Surrey, and W. Ellis has given it to me from near London, in 1882.

3. *Kiesenwetteri*, Först.

Pezomachus Kiesenwetteri, Först. Wieg. Arch. 1850, p. 133, ♀ ; Thoms. O. E. x. 1004, ♂ ♀. *Pezomachus bellicosus*, Först. Wieg. Arch. 1850, p. 141 ; Voll. Pinac. pl. xii. fig. 4, ♀. *P. Deheyii*, Först. Wieg. Arch. 1850, p. 142, ♀. (?) *P. venatorius*, Först. lib. cit. p. 219, ♀.

♀. Head with the vertex broad ; cheeks buccate, with no sulcus and their costa inflexed ; clypeus finely but not closely punctate, apically marginate and sub-truncate. Antennae with the basal flagellar joint slightly shorter than the second, but not shorter than the scape ; the fifth sub-quadrate. Metanotum not strongly convex, with the petiolar area impressed but ill-defined, very short and not basally costate ; apophyses wanting. Abdomen finely reticulate, very diffusely pubescent and obsoletely punctate, closest on the second segment, which, like the third, bears broad epipleurae with spiracles far from the margins ; basal segment stout with tubercles not prominent, and the post-petiole broad and convex ; terebra almost longer than the basal segment. Calcaria elongate.

Head black ; antennae red, becoming infusate from about the centre. Thorax and abdomen red, the latter with the third segment centrally and the following, except at their margins, piceous, as also is the terebra. Legs entirely red, or with the apical tarsal joint and the claws piceous.

♂. Winged. Cheeks buccate and dull ; mandibles slightly tuberculate. Metathorax rugosely punctate with notauli elongate and the areola and lateral costae not distinct. Wings with the stigma broad, radius emitted beyond its centre ; nervellus antefurcal ; discoidal cell acute-angled at its apex.

Black with the base of antennae and legs flavous. Length, 4-5 mm.

P. bellicosus appears to be nothing but a somewhat more fully developed form of this species bearing a trace of a scutellum and having the meta-

notum unusually convex,¹ with an irregular inflexed costa running across the centre of the petiolar area, and the second flagellar joint somewhat elongate. *P. venatorius* has the fifth flagellar joint twice longer than broad, and may, consequently, be distinct, but the conformation of the metathorax is identical with *P. bellicosus*, though the mandibles, clypeus, epistoma, inner orbits and occiput are all rufescent, possibly through immaturity. Elliott writes, "According to Förster's description, *P. Debevi* appears to differ from the form *bellicosus* in the slightly shorter second and fifth flagellar joints, somewhat less convex thorax, and in the colour of the third segment and apical tarsal joint. It is smaller, but I agree with Thomson in considering the two in reality only slightly varying specimens of the same species. Förster does not mention the scutellum in this species (we may therefore suppose that it is not visible); but I have noticed that in the larger and more strongly developed specimens of most species of this genus, both the basal costa of the petiolar area and the scutellum are more distinct than in the smaller."

The type form is certainly uncommon with us. Found among coarse herbage in Dorsetshire (O. P.-Cambridge, Entom. 1881, p. 137); Harris, in the Outer Hebrides (Dale, E.M.M. 1883, p. 237); Shere in Surrey (Capron); Appledore in Kent in April, and Oxshott in June, 1900; Enniscorthy, in September (Beaumont); Batten, near Plymouth, in July, 1894 (Keys); Deal, in July (Chitty); Felden in Herts. (Piffard); I took a specimen at Huntingfield, near Faversham, early in August, 1903. The form *bellicosus* is much commoner: Netherfield and Guestling in Sussex (Vict. Hist.); Bramford near Ipswich, in autumn (E.M.M. 1900, p. 42); Taynult and Harting, in September (Beaumont); St. Just, Nunton in Wiltshire, Botusfleming in Cornwall, and Isle of Wight (Marshall); Felden in Herts. (Piffard); Elie in Fife and Loch Awe in Argyll, in June (Evans); I have swept it from reeds in Barnby Broad in Suffolk and found it at the roots of *Matricaria* on the Kessingland cliffs in late July. Bridgman records the form *Debevi* first from Britain (Trans. Ent. Soc. 1887, p. 365), on the strength of a specimen taken by Champion in the Isle of Sheppey; and adds that in this example the petiolar spiracles are slightly prominent.

4. *zonatus*, Först.

Ichneumon araneorum, Fourc. E. P. 424; Gr. I. E. iii. 1096, ♂ ♀ (?). *Pezomachus zonatus*, Först. Wieg. Arch. 1850, p. 124, ♀; Thoms. O. E. x. 1002, ♂ ♀; Kriech. Ent. Nachr. xxv. p. 298, ♂.

♀. Head sub-triangular, with the cheeks somewhat short and not sulcate; clypeus deeply foveate basally, not centrally margined, with lateral fossulae. Antennae with scape sub-cylindrical and hardly emarginate apically; basal flagellar joint slightly shorter than the second and

¹ *Ichneumon Hoffmannseggii*, Gr. Mon. Ped. 100; *Pezomachus Hoffmannseggii*, Gr. I. E. ii. 918, ♀.

Antennae somewhat stout, about or a little more than half the length of the body. Thorax elongate, gibbulous with apophyses distinct. Abdomen oblong-ovate, as long as or slightly longer than the head and thorax; broader than the latter, with the basal segment gradually explanate towards the apex; terebra a little longer than half the abdomen. Legs normal.

Head black with the mouth infusate. Antennae infusate and paler beneath, with the three basal joints sometimes rufo-testaceous. Thorax red. Abdomen black with the petiole red. Legs piceous with the femora infusate, or infusate with the coxae ferrugineous. Length, 2 lines.

It is quite impossible to tell to what species this inadequately described "name" refers, and it is much better left in oblivion. The gibbulous thorax appears related to the form *bellicosus*. It has stood in our lists since 1870.

hardly longer than the scape; fifth as long as broad. Thorax finely and closely punctate, with meso- and meta-thorax of equal length; petiolar area slightly impressed centrally, with its basal costa sub-obsolete, and apophyses very small and low. Abdomen very closely punctate and pilose throughout, the punctures rather distinct, the interstices not reticulate and pubescence elongate; petiole long, with tubercles more or less prominent; post-petiole not transverse moderately broad apically; terebra of variable length, usually nearly half the length of the basal segment, sometimes barely visible. Legs stout, with long and stout calcaria.

Head black, with clypeus usually red-bordered and the face more or less red-marked; palpi and mandibles red. Antennae with the ten basal joints fulvous, the remainder piceous; scape often infusate. Thorax and abdomen clear red, the latter with three usually very conspicuous black bands of variable extent in the centre of the second and third segments and at base of the latter; the third and fourth segments sometimes infusate, with or without red margins; sheaths of the spicula black. Legs red, with the apex of the hind and sometimes intermediate femora and tibiae piceous, as also is the apical tarsal joint.

♂. Winged. Head contracted behind the eyes and towards the mouth; cheeks compressed; clypeus discreted, small, shining and apically rounded. Antennae elongate, filiform and slender. Thorax dull; metathorax more coarsely coriaceous with complete areae and the costulae wanting or externally obsolete; areola hexagonal and apically truncate; petiolar area high and finely transcostate; apophyses wanting. Scutellum somewhat large, elevated and not margined. Abdomen narrow and cylindrical; petiole elongate and narrow with very prominent tubercles, post-petiole parallel-sided and not much broader; second and sixth segments not broader than long, closely subgranulose-aciculate. Legs sub-elongate. Wings ample with the basal nervure sub-vertical, apical abscissa of the radius but little longer than the basal; nervellus strongly antefurcal. Finely and closely punctate, with long pilosity.

Black, with the palpi testaceous. Two basal flagellar joints and often most of the prothorax rufescent. Wings not infumate; stigma testaceous, or black with the base white; radix rufescent, tegulae flavous. Abdomen with apex of the first segment, whole of second or all its margins, and the sides of the third, red. Legs bright red, with the coxae sometimes black; apex of the hind tibiae and of their tarsi piceous. Length, 3–5 mm.

There is a poor figure of the ♀ in Wood's "Insects at Home," pl. x. fig. 1.

I fail to detect any discrepancy between the above-described ♂ and that of Kriechbaumer (*loc. cit.*) except that the latter has only the annellus red, the whole of the fourth and extreme apices of the fifth and sixth segments concolorous; he does not mention the sculpture of the second segment.

Bridgman bred *P. zonatus* from a spider's nest, which looked like a small dab of mud, on the end of a blade of grass, and adds that the larva did not require all the eggs which the nest contained for its sustenance, and consequently many little spiders were afterwards hatched (Entom. 1878, p. 35); both sexes are represented in his collection. In 1879 he bred two specimens from the same host, one of which has but two slight

dark marks to indicate the usually conspicuous bands—"a little more and they would be absent," he writes to Fitch, "and then, according to Förster, it would belong to a different species!" He thought this species commonest in June. It has several times been bred from the nests of the above spider, *Agroeca brunnea*, Bl., in July, both here and in France.

Land's End (Marquand); common in Norfolk (Bridgman); Hastings and Guestling in Sussex (Vict. Hist.); Dorsetshire (Ent. 1881, p. 137); Epping (in Brit. Mus.); Whauphill in Wigtonshire, in April (Gordon); Isle of Man (Tomlin); Guestling Wood, in moss (Bennett); Chiddingfold (Donisthorpe); Felden in Herts. (Piffard); New Forest and Clacton (W. Ellis); Richmond in Yorks. and Oxford, in October (Chitty); Oxshott and Boxhill, in May and July (Beaumont); both sexes at Shere in Surrey (Capron). The female has occurred to me in tufts of *Aira caespitosa* at Brede near Hastings, in April, and in the Bentley Woods in November, as well as in moss at Foxhall, in March. In August I have taken the male at Lyndhurst, and possess another found by Wilson Saunders at Greenings in Surrey, in June, 1871. Miss Chawner has bred seven females and one male from the nests of the above spider at Burley in the New Forest, between July and September.

5. *vulpinus*, Grav.

Ichneumon vulpinus, Gr. Mon. Ped. 96. *Pezomachus vulpinus*, Gr. I. E. ii. 914; Först. Wieg. Arch. 1850, p. 116, ♀; Thoms. O. E. x. 1002, ♂ ♀.

♀. Head finely alutaceous, strongly and closely punctured, dull; clypeus with deep basal foveae and shallow lateral impressions; genal sulcus wanting. Antennae moderately long; first joint of flagellum little, if at all, longer than second, and scarcely longer than the scape; fifth longer than wide. Thorax finely alutaceous, dull, as closely and distinctly punctured as the head; meso- and meta-notum equal in length; petiolar area flat and broadly impressed in the middle; its basal costa wanting. Abdomen convex, subopaque, with dense, rather strong puncturation, and moderately close pubescence; the interstices between the punctures appear smooth, not aciculate, as is usual in this genus; segment one long and narrow, only slightly widened from middle to apex; the spiracles vary from almost invisible to moderately prominent; post-petiole punctate, not transverse; spiracles on segment two far from the margin; posterior margins of segments two to six depressed and shining; terebra not, or very slightly, exerted.

Head black. Antennae red to middle, thence brownish. Thorax and abdomen red or rufo testaceous; pubescence fulvous. Legs red; posterior femora from middle to nearly the apex, and the extreme apex of posterior tibiae, brownish.

♂. Winged. Metathorax strongly rugulose; areola and lateral costae indistinct; petiolar area long. Wings short; basal nervure nearly vertical; apex of radius a little longer than base; nervellus greatly ante-furcal. Abdomen broadly fusiform, moderately punctured.

Head and thorax black. Abdomen rufo-testaceous, with the base and apex black. Coxae black; femora entirely red, or marked with black; tibiae red. Length, 3-6 mm.

Very like *P. aquisgranensis*, but the antennae are shorter and the abdomen less strongly punctured and broader. The female differs from

P. myrmecinus in the sub-opaque, densely punctured and fulvous-haired segments of the abdomen, and in the depressed, shining margin of segments two to six. The male may be distinguished by the longer antennae, broader and less strongly punctured abdomen, which is centrally red.

This species was introduced as British by Desvignes, in 1856, but I have heard of no specific records. It is said to be a parasite of *Formica rufa* on the Continent (Kirchner and Wasmann).

6. *costatus*, Bridg.

Pezomachus costatus, Bridg. Trans. Ent. Soc. 1886, p. 341, ♀.

Head large and slightly oblique behind the eyes; not very closely punctate with short pubescence, which is closer on the clypeus; mandibular teeth of equal length. Antennae stout, about three-quarters the length of the body; the second flagellar joint rather longer than the first, which is twice longer than broad; fifth very slightly longer than broad. Thorax very sparsely punctate and pubescent; metanotum glabrous and scarcely higher than, and about as long as, the punctate mesonotum; petiolar area sub-vertical and not short with no basal costa, but with an often obsolete wavy costa running across its centre; apophyses obsolete. Scutellum indicated, broad and hardly discreted. Abdomen closely but very distinctly punctate and pubescent throughout; basal segment sub-pyriform and laterally margined with the post-petiole usually somewhat rounded, its spiracles hardly or not at all visible; terebra about as long as the basal segment.

Head black, with the mandibles and inner, and often frontal, orbits clear red; mandibular teeth deep black. Antennae with the basal half red. Thorax and legs clear red. Abdomen black, with the two or three basal segments red and the remainder broadly red-margined. Length, $4\frac{1}{2}$ – $5\frac{1}{4}$ mm.

This species is very closely related to *P. Kiesenwetteri*, from which it differs in its larger size, broader and much more distinctly punctate abdomen, stouter flagellum, which has the basal joint somewhat shorter than the second.

It was found not uncommonly about Norwich by Bridgman; and has occurred to Capron at Shere in Surrey; Piffard at Felden in Herts.; Chitty at Huntingfield in Kent, in August; Bignell at Plym bridge in Devon, early in August; and to Fletcher, probably at Worcester. Bennett has taken it at Camber in Sussex (Vict. Hist.); and at the end of July, 1904, I secured an example at the roots of *Matricaria* on the top of the cliffs at Kessingland in Suffolk.

7. *rufipes*, Först.

Pezolochus rufipes, Först. Wieg. Arch. 1850, p. 104, ♀; *Pezomachus rufipes*, Thoms. O. E. x. 1002, ♂ ♀. *P. aries*, Först. Wieg. Arch. 1850, p. 104, ♀. *P. forticornis* et *ecarinatus*, Först. lib. cit. p. 135, ♀ ♀. *P. melanophorus*, Först. lib. cit. 1851, p. 52, ♂.

♀. Head dull, with short and diffuse pubescence; peristomium broad, mandibles long and stout; clypeus discreted by a curved impression and with no lateral foveae; genal sulcus wanting. Antennae short, with the

joints sub-moniliform, inserted almost level with the lower angle of the eyes; basal flagellar joint distinctly shorter than the second and shorter than the scape; the fifth slightly broader than long. Meso- and metanotum of equal length; petiolar area sub-vertical, short, rugose and centrally impressed; its basal costa wanting, apophyses small and approximating apex. Abdomen finely alutaceous, diffusely but distinctly punctate, with short pubescence; basal segment somewhat short, gradually and strongly explanate; post-petiole sub-convex and apically very broad, with the tubercles not prominent; terebra of variable length.

Head dull black; antennae piceous with the scape apically flavescent. Thorax black, sometimes with the prothorax and front of mesonotum rufescent. Abdomen black; apex of first segment and the base and sides of the second narrowly fulvescent. Legs immaculate flavous, with the apical tarsal joint brownish (type form), or more or less marked with piceous.

♂. Winged. Antennae inserted below the centre of the orbits, stout, scarcely attenuate towards their apices. Metathorax finely rugose with the areola indistinct. Wings with the stigma not broad and the nervellus antefurcal. Post-petiole broad and sub-convex; the second and third segments sub-rugosely punctate.

Black; apices of anterior femora, broadly, and all the tibiae pale, with the posterior black at base and apex. Wings griseous and coxae black. Length, 3-5 mm.

This species was placed by Förster in a distinct genus on account of its very short and broad face and clypeus, and narrow mandibles. Thomson, however, did not consider it merited generic rank, and thought it synonymous with *Pezomachus aries* and *P. ecarinatus*; to these I have ventured to add *P. forticornis*, which differs only in its sub-oblique petiolar area, bearing a faint indication of a basal costa, and has the four basal flagellar joints dark red and the apical margins of all the segments indeterminately red.

This is the "*P. arenarius*, Hal." of the British Museum collection.

It is by no means uncommon with us, though I know of no records. Deal, in May, 1872 (E. Saunders); Felden in Herts. (Piffard); Shere in Surrey (Capron); Niton, Isle of Wight (Marshall). I have found it on the banks of the Gipping at Ipswich, in July; in *Aira caespitosa* in the Bentley Woods, in November and December; running on sand with *Lasius niger* at Foxhall in August; at roots of *Senecio jacobaea* at Brandon, in June; on the coast at Southwold and Lowestoft, among *Cruciferae* and *Ononis*; and Elliott has swept it in Burwell Fen, in Cambridgeshire.

I have no hesitation in ascribing *P. melanophorus* to the present species, from the female of which it differs only in its parallel-sided post-petiole, longer basal flagellar joints, small scutellum and punctiform wings. It has not been noted in Britain hitherto, but I was so fortunate as to capture an example in a crag-pit at Foxhall, near Ipswich, early in June, 1898.

8. *cautus*, Först.

Pezomachus bicolor, Gr. I. E. ii. 902 (part). *P. cautus*, Först. Wieg. Arch. 1850, p. 190, ♀. [(?) *Hemimachus rufipes*, Bridg. Trans. Ent. Soc. 1883, p. 157, ♂.]

♀. Head dull, very finely punctate and much broader than the thorax. Antennae somewhat elongate, with the basal flagellar joint slightly longer

than the second ; the fifth imperceptibly longer than broad. Thorax short ; mesonotum deplanate with no notauli ; metathorax convex and not longer than the sub-vertical petiolar area, whose basal costa is not strong though distinct throughout, with very small and obtuse apophyses. Scutellum not indicated. Abdomen closely punctate and pubescent ; basal segment not long and evenly explanate to the somewhat broad apex, its spiracles not prominent ; terebra fully as long as the basal segment. Legs not slender.

Head black ; antennae piceous, with the three or four basal flagellar joints rufescent. Thorax red, with piceous markings above the hind coxae. Abdomen with the basal segment red, the second piceous with all the margins narrowly red, the remainder piceous with fine red apical margins. Legs clear red, with the apical tarsal joint infusate. Length, $3\frac{1}{2}$ mm.

This species differs from *P. bicolor* in the weaker metathoracic costa, the absence of the scutellum and in the non-projecting petiolar spiracles. From *P. circumcinctus*, Först., it may be known by the deplanate mesonotum, by the distinct metathoracic costa and by the more nitidulous abdomen. It superficially resembles *P. formicarius* in shape and coloration, but the antennae are longer and more slender, with the second flagellar joint shorter than the first, the petiolar area is basally costate and the basal segment is much stouter.

I possess a single example taken by Piffard at Felden in Herts, and have seen two others captured at Whauphill in Wigtonshire, in April, by J. G. Gordon.

[? ♂. Densely and finely reticulate and somewhat dull. Head transverse, contracted behind the eyes, cheeks not buccate ; face slightly protuberant, transverse ; inner orbits parallel ; clypeus discreted and apically rounded ; mandibular teeth sub-equal in length. Antennae as long as the body, with the two basal flagellar joints of about equal length and four times longer than broad. Thorax with notauli indistinct ; metanotum about as long as petiolar area, with two transverse curved costae, but no areola. Basal segment slender and elongate, post-petiole a third longer than broad, spiracles prominent ; second a little longer than broad. Areolet imperfect ; nervellus nearly antefurcal, intercepted one-third from bottom ; nervelet wanting.

Black, with the mouth, base of antennae and legs red ; pronotum binate with red ; three basal segments red, first laterally to centre, third transversely fasciated in the centre with, piceous ; remainder sometimes apically pale ; stigma infusate. Length, 4 mm.

I tentatively place Bridgman's ♂ here for lack of a more certified position ; it is evidently that of one of the red-bodied *Pezomachi* ; and two examples were taken near Norwich, in July.]

9. *aemulus*, Först.

Pezomachus aemulus, Först. Wieg. Arch. 1850, p. 146, ♀ ; cf. Bridg. Trans. Ent. Soc. 1887. p. 365.

Head dull and finely pilose. Basal flagellar joint elongate and not longer than the second ; the fifth hardly longer than broad. Thorax comparatively short, with the meso- and meta-notum of equal length ; notauli usually strong and anteriorly confluent ; petiolar area sub-oblique, its basal

costa somewhat strong throughout, centrally high and broadly curved ; apophyses small and acute. Scutellum wanting. Abdomen moderately closely and evenly punctate and pubescent to the apex ; petiole slightly and post-petiole more distinctly explanate, with the sides divergent and spiracles only slightly though visibly projecting ; terebra (in the typical form) only about half the length of the basal segment.

Head dark red, with the frons and occiput centrally piceous. Antennae red-yellow, with the extreme apex infusate. Thorax, abdomen and legs uniform rufo-testaceous, with only the terebra and apical tarsal joint piceus. Length, 3-4 mm.

The smaller examples strongly resemble *P. corruptor*, but the basal flagellar joint is not longer than the second, and the head is usually red.

Brischke has bred this parasite from *Cuculia argentea*, and mentions a variety with the terebra as long as the first segment and the abdomen infusate.

Bridgman brought this species forward as British (Trans. Ent. Soc. 1887, p. 365) on the strength of two females in Champion's collection, which he says differ from Förster's description in having the terebra almost as long as the basal segment and, in one example, the anus infusate. Piffard has several times taken it at Felden in Herts., Miss Chawner in the New Forest, Willoughby Ellis at Clacton in Essex, and Bloomfield at Guestling in Sussex. I have once swept it at dusk, in the Bentley Woods, in October.

10. *vulnerans*, Först.

Pezomachus agilis, Gr. I. E. ii. 897 (part). *P. vulnerans*, Först. Wieg. Arch. 1850, p. 189, ♀.

Antennae with first joint of flagellum scarcely longer than second ; fifth scarcely longer than wide. Meta- only a little longer than meso-thorax ; slope oblique ; ridge very strong, the projections sharp and conspicuous. Abdomen closely punctured and pubescent ; first segment only slightly widened ; spiracles not projecting ; terebra decidedly longer than first segment.

Head, thorax and abdomen black ; antennae with apex of second and base of third joints yellow. Legs red-yellow ; femora, apex of middle and hind tibiae and the hind coxae, brownish ; last tarsal joint and claws red-yellow, like the rest of tarsi. Length, 3 mm.

Said to be at once distinguished from all others of this genus by the long terebra, strongly acuminate apophyses, and by the colour of the last tarsal joint and claws. Introduced as British by Bridgman (Trans. Ent. Soc. 1886, p. 342) on the strength of four females captured at Headley and Reigate.

11. *canaliculatus*, Först.

Pezomachus hortensis, var. 1, Gr. I. E. ii. 908, excl. ♂. *P. canaliculatus*, Först. Wieg. Arch. 1850, p. 229, ♀.

Head dull ; antennae with joints one and two of flagellum equal ; fifth scarcely longer than wide. Meso- and meta-thorax equal, latter with deep longitudinal impression, which is less distinct on former ; metathoracic costa sub-obsolete above, more distinct at sides, but not prominent below.

Abdomen diffusely punctured and pubescent, shining; first segment with slightly projecting spiracles. Legs stout.

Head deep black; antennae red to middle, thence gradually darker to the black-brown apex. Thorax red. Abdomen with segments one to four red, the rest black, with narrow red posterior margins. Legs red, exactly same colour as thorax and basal segments of abdomen; hind femora at apex, the middle and hind tibiae, and last tarsal joint brown. Length, 2-3 mm.

This species receives its name from the longitudinal furrow on thorax, which is most distinct on the metanotum, but Förster says that in one of his specimens this furrow was absent! This feature reminds one of the *Stilpnini* rather than the present genus, but the absence of all mention of shape or outline precludes further classification.

It was first recorded from Britain by Marshall in his 1872 Catalogue, but I have heard of no captures having been effected since that time, and the species must be regarded as doubtfully indigenous.

12. pilosus, Capron.

Pezomachus pilosus, Capron, E.M.M. 1888, p. 217, ♀.

Head broader than thorax; antennae very stout and sub-attenuate at base and apex; basal flagellar joint shorter than the second; fifth sub-transverse. Metathoracic transverse costa centrally wanting, though laterally distinct; petiolar area smooth and somewhat excavate centrally; thorax clothed with elongate bristly hairs. Abdomen somewhat nitidulous, with diffuse long erect hairs, between which the surface is finely reticulate; basal segment somewhat long and gradually explanate apically, with prominent spiracles between the centre and apical third; terebra slightly shorter than the basal segment.

Head dull black; antennae with the four basal flagellar joints fulvous. Prothorax sometimes entirely black; mesonotum pitchy red, with a black spot on the disc; metathorax red, often with the sides and petiolar area black. Abdomen piceous black, with the basal segment, except a central discal line, red. Legs red. Length, 5-6 mm.

This species is easily recognized by the bristly hairs which clothe the thorax and abdomen. Three specimens were originally taken by Dr. Capron in 1887, at Shere in Surrey; these are now in my collection. It has since been found by Beaumont at Appledore in Kent, in September and October, 1900. I possess two females captured by Piffard at Felden in Herts.; in these the abdomen is unusually coarsely and distinctly punctate. Chitty has taken the same form at Huntingfield in June, 1905.

13. acarorum, Linn.

Mutilla acarorum, Linn. S. N. ii. 968 (*nec* Schr.). *Pezomachus acarorum*, Thoms. O. E. x. 1017, ♂ ♀ (*nec* Grav.). *P. hortensis*, Gr. I. E. ii. 907 (part), excl. ♀; cf. i. Suppl. 717, ♂. *P. xylophilus*, Först. Wieg. Arch. 1850, p. 169, ♀. *P. avidus*, Först. *lib. cit.* 1851, p. 33, ♂.

Cheeks buccate, with the sulcus indistinct and costa inflexed; mandibles tuberculate basally; clypeus broadly truncate-marginate at apex. Antennae short and stout; basal flagellar joint hardly longer than the

second; fifth only slightly longer than broad. Mesonotum transverse and decidedly shorter than metathorax, about as long as metanotum; petiolar area only slightly oblique, its basal costa weak, often wanting centrally, with apophyses small; acetabula occupying nearly whole of mesosternum. Abdomen moderately punctured and pubescent to the apex, not dull; spiracles on the basal segment more or less projecting, on the second not far from its margins; terebra as long as, or slightly shorter than, the basal segment. Legs stout, with the front tibiae inflated; front coxae produced nearly to the base of the intermediate.

Head black, with the palpi dull flavous. Antennae with the four or five basal joints red, thence piceous. Thorax and abdomen red, latter with the apical half from the fifth or fourth segment suddenly black. Legs pale red, with the posterior femora and tibiae apically black.

♂. Apterous. Flagellum with basal joint longer than second; fifth nearly twice longer than broad. Meso- and meta-thorax of about equal length, latter with its transverse costa distinct at the sides only. Scutellum more or less distinctly developed. Abdomen somewhat diffusely punctate and pubescent; basal segment with prominent spiracles, the petiole very little explanate, the post-petiole a little broader and with sub-parallel sides.

Head black, with the palpi flavous and mandibles apically piceous. Antennae with the three basal joints clear red, the rest gradually darker to the piceous apex. Thorax pale red, with the metapleurae darker. Abdomen with the three basal segments pale red and the remainder black; the first and third sometimes infusate. Legs red; hind femora mostly and their tibiae apically piceous. Wings usually entirely wanting, though sometimes fully developed. Length, $1\frac{3}{4}$ – $2\frac{1}{4}$ lines.

The ♂ is very like that of *P. agilis* but differs in having the acetabula scarcely covering more than half the mesosternum, and the three basal segments more or less red. The ♀ differs from *P. corruptor* in the shorter terebra, transverse metanotum, dark anus and legs. I have considered all the British mentions of *P. xylochophilus* as referring to this species; "*P. acararum*, Fab.," is only recorded by Dale, as abundant at Glanvilles Wootton; *P. acarorum*, Grav., is now considered distinct and does not appear to be British.

Bridgman professes to have first recorded the typical form of *P. hortensis* from Britain, on Professor Thomson's authority (Trans. Ent. Soc. 1886, p. 341), having taken a single male at Brundall, though he does not tell us wherein it differs from that given as synonymous with *Hemimachus avidus* in Marshall's 1872 Catalogue and, indeed, it was distinctly (though not very reliably) given as British by Desvignes in 1856.

P. avidus, Först., is recorded from Heigham osier carr, near Norwich, by Bridgman, as a species distinct from *P. hortensis*, Grav. (Trans. Norf. Soc. 1893, p. 617); Marshall took several males on the banks of a reedy pond in Leicestershire, of which one, most positively identical, was winged (Ent. Ann. 1874, p. 127); Elliott has determined a female taken in the Carlisle district by Day, early in October, 1899; Butler has an example, somewhat doubtfully named *hortensis* by Bridgman, taken at Battle in Sussex. It has been bred from *Microgaster* cocoons by Brischke and from *Psyche Constancella*, Perris, by Giraud.

P. xylochophilus was recorded as British by Bignell (Entom. 1882, p. 45), obtained by beating whitethorn at Exminster early in September,

1881; taken by Bridgman by sweeping in the Brundall marshes near Norwich, and recorded by him (Trans. Ent. Soc. 1882, p. 148) from Rainham in Essex, and subsequently from Horning Ferry in Norfolk. Beaumont has taken it at Appledore in Kent in mid-September, and Capron at Shere in Surrey. Piffard had found both sexes at Felden in Herts.; W. Ellis the female at Knowle and Egginton, near Birmingham; and Yerbury at Waterville in Ireland, in July. It has invariably occurred to me by sweeping aquatic plants in April, June, July, September and October at Ipswich, Bramford and Dennington, in Suffolk; and in Ranworth Broad, in Norfolk; the male I have only taken at Barton Mills, near Brandon.

14. *mandibularis*, Thoms.

Pezomachus mandibularis, Thoms. O. E. x. 1009, ♂ ♀.

♀. Frons alutaceous, dull; lower face broad; genal costa continuous; sulcus deep; cheeks smooth, sub-compressed; clypeus raised in front, apex rounded; mandibles scarcely tuberculate at base; vertex broad, narrowed behind the eyes, deeply and almost angularly emarginate. Antennae slender; first joint of flagellum about as long as second, and half as long again as the scape. Mesonotum elongate; petiolar area well defined, smooth, its basal costa present; scutellum indicated; acetabula occupy nearly the whole of the mesosternum. Abdomen with moderate pubescence, which is more diffuse towards the apex; petiole long but not broad; post-petiole sub-transverse; spiracles rather prominent; terebra as long as first segment. Femora rather slender.

Head black, mandibles yellow. Thorax rufo-testaceous. Abdomen testaceous, black-banded, or with the apex fuscous. Legs testaceous.

♂. Winged. Mesosternum saccate; epicnemial slender; petiolar area distinct. Parallel nervure emitted above middle of brachial cell; nervellus opposite; radius emitted from centre of stigma, which is not broad. Segment two of abdomen long.

Black. Pronotum testaceous; segments one to three yellow. Legs testaceous. Length, 3-4 mm.

Closely allied to *P. carnifex*, but differs in the female by the longer mesonotum, more slender antennae and femora, more prominent spiracles, shorter post-petiole, black head, flavous mandibles, and in the colour of the abdomen. In the male it differs in the parallel nervure being emitted above the middle of the cell, and in the testaceous pronotum.

A single male of this species, taken in September by Bridgman, in the neighbourhood of Norwich, was named by Professor Thomson (Trans. Ent. Soc. 1886, p. 341).

15. *festinans*, Grav.

Pezomachus festinans, Gr. I. E. ii. 926, excl. synon.; Först. Wieg. Arch. 1850, p. 121, ♀. *P. posthumus*, Först. lib. cit. p. 138, ♀. *P. ocissimus*, Först. lib. cit. 1851, p. 36, ♂.

♀. Head somewhat nitidulous. Antennae two-thirds the length of the body, with the basal joint of flagellum as long as the second; the fifth somewhat longer than broad. Metathorax short, with the petiolar area oblique, only slightly impressed and not costate basally. Scutellum very

distinct, though small. Abdomen only moderately closely punctate and pubescent; basal segment not tuberculate, basally narrow but strongly explanate beyond the centre; terebra scarcely half the length of the basal segment.

Head, thorax and abdomen uniformly black or black-brown. Antennae piceous, with the apex of the pedicellus and base of flagellum flavous. Legs nigro-fuscous; trochanters, apices of femora, base of tibiae and the tarsi more or less, pure flavous. The tibiae become gradually darker from the centre to the apex; the apical tarsal joint and the claws are also darker. Length, $1\frac{1}{2}$ –2 mm.

♂. Brachypterous. Head black, with the palpi and base of mandibles red. Antennae piceous, with the first flagellar joint basally red and hardly longer than the second; fifth half as long again as broad. Thorax entirely black; meta- shorter than the meso-thorax; petiolar area oblique, with no basal costa. Scutellum distinct. Abdomen somewhat closely punctate and pubescent, black; basal segment with very prominent spiracles; petiole slightly, post-petiole more strongly explanate, parallel-sided and apically broad. Legs piceous; trochanters, apices of anterior femora, front tibiae and all the tarsi, fulvous. Both pairs of wings punctiform and white. Length, 2 mm.

This female appears to differ from *P. quaesitorius*, Först., in the absence of a basal costa in the petiolar area and its shorter metathorax; and from *P. ineptus*, Först., in the presence of the scutellum, broad post-petiole and dark legs.

Probably very common with us, though overlooked on account of its small size. Found among coarse herbage in Dorsetshire (Pickard-Cambridge, Entom. 1881, p. 137). Piffard has taken several at Felden in Herts.; Evans one at Glenfarg in Perthshire, in September; and Capron a long series at Shere in Surrey. It has occurred to me at roots of *Senecio jacobaea* in sandy places at Brandon, and in crag-pits at Foxhall in June; at the roots of *Onopordon acanthium* in a marsh at Wherstead in early May, and running on the warm shore-sands at Felixstowe and Bawdsey in mid-August. Chitty has found it at Huntingfield and Doddington, in Kent, Tubney, Sharsted, Buddon Wood, and Lees. *P. ocissimus* has not before been noticed in Britain; I took it beneath herbage on the sandy beach at Southwold in Suffolk, in July, 1900; and consider Nees quite correct in regarding it as the male of the present species.

The form *posthumus* appears to be nothing but of slightly less full development, with no distinct scutellum, the abdomen diffusely punctate and pubescent, the whole insect presenting the exact facies of *P. festinans*, though uniformly brunneous with the basal segment lighter. I have, moreover, taken it in company with the type form on the sandy ground about Brandon beneath *Senecio jacobaea* in June; Piffard has found it at Felden near Boxmoor, and Bridgman records it from Mousehold near Norwich. Evans has sent it to me from the Island of St. Kilda.

16. *hieracii*, Bridg.

Pezomachus hieracii, Bridg. Trans. Ent. Soc. 1883, p. 162, ♀. (?) *P. linearis*, Först. Wieg. Arch. 1851, p. 45, ♂.

♀. Head transverse and somewhat contracted behind the eyes. Antennae normal; two basal flagellar joints of about equal length and about

three times longer than broad; fifth a little longer than broad. Meso- and meta-thorax of about equal length and both very short; petiolar area deplanate and oblique, its basal costa wanting. Abdominal pubescence dense and uniform throughout; basal segment apically broad with its spiracles not projecting; the remaining segments transverse, with the second and third much shorter than is usual in this genus, and scarcely as deep as the apex of the basal; terebra a little longer than the first segment.

Black, with the third antennal joint basally pale and the first abdominal segment apically piceous. Legs lighter or darker piceous, with all the trochanters pale; apex of anterior femora, the front tibiae and tarsi rufescent; base of the intermediate tibiae, centre and apex of the hind tibiae and the hind tarsi, also reddish; apical tarsal joints infusate. Length, $2\frac{3}{4}$ – $3\frac{1}{4}$ mm.

?♂. Head black, palpi piceous and mandibles darker. Antennae piceous, with the apex of the scape and extreme base of flagellum testaceous; latter with the basal joint a little longer than the second, fifth nearly three times longer than broad. Thorax elongate, narrow and black; petiolar area very short with no basal costa. Scutellum distinct and discreted. Abdomen elongate-linear, densely punctate, black; basal segment short, basally broad, tubercles obsolete, apex very broad. Legs piceous with apex of trochanters, extreme base of all the femora and apex of the anterior more or less testaceous, as also are the base of the hind, and as far as the centre of intermediate, tibiae; tarsi entirely piceous. Apterous. Length, 2–3 mm.

I venture to tentatively associate these two species as sexes of the same, on account of the similarity of the dense abdominal pubescence, broad basal segment which has obsolete tubercles, the absence of the transverse metathoracic costa, black abdomen and piceous legs; though the brevity of the ♀ thorax hardly coincides with the length of the male's. Bridgman tells us that the female is closely allied to *P. tener*.

He adds that the smaller female was taken at Burford Bridge in September, 1881; and the larger bred from the galls of *Aulax hieracii* in Britain. The male is only recorded from Hastings (Vict. Hist. Sussex).

17. *nigritus*, Först.

Pezomachus nigritus, Först. Wieg. Arch. 1850, p. 128; Voll. Pinac. pl. xii. fig. 3, ♀; Thoms. O. E. x. 1005, ♂ ♀.

♀. Head twice broader than thorax, with the genal sulcus deeply impressed and the cheeks not longer than the basal width of the mandibles; vertex high and deeply but not broadly emarginate; clypeus apically truncate; mandibles not basally tuberculate, and labrum free. Antennae stout and filiform; two basal flagellar joints of equal length; the fifth longer than broad. Mesonotum as long as the meta, which is sub-glabrous and nitidulous; petiolar area of variable length, with its basal costa wanting and surface oblique; acetabula occupying whole of mesosternum. Scutellum distinctly indicated. Abdomen closely and finely punctate and pubescent, dull; basal segment short and deplanate with no

tubercles ; post-petiole broad and transverse ; second segment with epipleurae narrow and spiracles small, far from the margin ; terebra as long as the basal segment.

Head black, with the palpi piceous ; mandibles red and apically piceous. Antennae black or piceous, with apex of scape and extreme base of flagellum fulvous. Thorax normally black, rarely castaneous or dull testaceous. Abdomen black, with the basal segment often more or less testaceous. Legs piceous, with the coxae and trochanters black and the femora, tibiae and tarsi more or less flavous-marked.

♂. Winged. Vertex not narrow ; antennae elongate and sub-setaceous ; mesonotum convex and short ; mesosternum saccate ; epicnemial slender. Wings sub-hyaline with the stigma broad and basally white ; nervellus strongly antefurcal. Abdomen not punctate, smooth and shining, and diffusely pubescent ; post-petiole quadrate. Petiolar area nitidulous and as long as the metanotum.

Black, with the second segment entirely pale or only at base and apex. Length, 3-4 mm.

Förster says the female is very like *P. festinans*, but may be distinguished by the more slender antennae and longer metathorax.

Bridgman writes (Trans. Ent. Soc. 1881, p. 155), "Mr. Billups has taken at Deal, in August, a small black *Pezomachus*, which I believe to be this species." Subsequently (Trans. Norf. Soc. 1893, p. 616) he records it from Earlham, Eaton and Brundall, near Norwich ; and Bignell (Entom. 1882, p. 45) says it has been bred at Liverpool parasitically from the galls of *Aulax hieracii* on *Hieracium umbellatum*. It appears to be restricted to sandy places, since I have only found it on the sandy cliffs at Corton and Southwold in August, and in sandy places about Brandon, in Suffolk, in early June.

18. *spinulus*, Thoms.

Pezomachus spinula, Thoms. Opusc. Ent. x. p. 1006, ♂ ♀.

Head much broader than thorax ; cheeks not longer than width of mandibles ; genal sulcus deep ; vertex deeply emarginate ; clypeus truncate at apex ; mandibles not tuberculate at base, narrow at apex ; eyes large. Antennae filiform ; first and second joints of flagellum equal in length ; fifth longer than wide. Meso- and meta-thorax equal in length ; no trace of scutellum ; metathorax glabrous ; petiolar area nearly vertical, its basal costa indicated by two very small dentiform projections. Abdomen closely and finely punctured and pubescent ; first segment moderately broad ; spiracles not projecting ; terebra almost shorter than first segment.

Black ; apex of scape and base of flagellum, and legs more or less, pale-marked. Length, 4 mm.

The ♀ differs from *P. nigrinus* in the absence of the scutellum, the vertical petiolar area with small spines at its base, narrower petiole, longer terebra and darker legs. Male apterous. Differs from that of *P. nigrinus* in its more robust form, darker legs and in the absence of wings.

This species was brought forward as British by Bridgman on the strength of a single male so named by Professor Thomson (Trans. Ent. Soc. 1886, p. 341), which was taken in the neighbourhood of Norwich.

19. *tener*, Först.

Pezomachus agilis, var. 5e, Grav. I. E. ii. 899. *P. tener*, Först. Wieg. Arch. 1850, p. 120, ♀.

Antennae almost as long as the whole body; first joint of flagellum about as long as second; fifth slightly longer than wide. Metathorax very short, appearing scarcely half as long as the mesothorax; the petiolar area very large, broad and almost quadrate, its basal costa entirely wanting. Abdomen somewhat closely punctured and pubescent; first segment not tuberculate; terebra shorter than first segment.

Head, thorax and abdomen uniform coffee-brown; antennae brown, with the apex of pedicellus and extreme base of first joint of flagellum yellow. Legs brownish; trochanters, extreme apex of femora, extreme base of tibiae and all the tarsal joints rufo-testaceous. The sheaths of the terebra are yellowish. Length, $1\frac{1}{2}$ mm.

The formation of the thorax and the colour of the legs are said to be sufficient to distinguish this species. Not uncommon about Norwich (Bridgman); Exminster, early in July (Bignell); Maldon in Essex (Fitch); Battle, in Sussex (Vict. Hist.); Dorsetshire (Entom. 1881, p. 137).

20. *micrurus*, Först.

Pezomachus micrurus, Först. Wieg. Arch. 1850, p. 187, ♀; Thoms. O. E. x. 1007, ♂ ♀.

♀. Cheeks short, with their sulci deeply impressed; vertex deeply emarginate; clypeus apically truncate; mandibles apically narrow and basally not tuberculate. Antennae with basal flagellar joint imperceptibly longer than the second and the fifth very slightly longer than broad. Metathorax shorter than the meso, with the petiolar area oblique, its basal costa forming a high, broad arch; apophyses small and acute; acetabula occupying the whole mesosternum. Abdomen densely and finely punctate and pubescent; basal segment with no projecting tubercles, petiole curved and broad, post-petiole very broad and strongly transverse; second and third segments with spiracles far from the lateral margins; terebra less than half the length of the basal segment. Legs stout, the hind ones curved and elongate.

Head black; antennae dark piceous, with the scape and base of flagellum red. Pro- and meso-thorax fulvous, with the sides of the latter and whole metathorax black, the colour being sharply defined. Abdomen black, with the two basal segments entirely, and the apical margins of the remainder, red. Legs testaceous or red, with the apical tarsal joint piceous.

♂. Apterous. Petiolar area distinct; abdomen fusiform with the petiole stout, curved and the tubercles in the apical third. Legs stout.

Black, with the legs and base of antennae flavous. Length, 3-4 mm.

A specimen of this species was swept in the neighbourhood of Exeter, in the middle of July, 1866, by Parfitt; and another, from Dorsetshire, by Pickard-Cambridge (Trans. Ent. Soc. 1881, p. 156 *et* Entom. 1881, p. 137). Bred in South Devon from the egg-bag of a spider, *Ocyale* (*Pisaura*) *mirabilis*, on the 16th and 18th July, 1883 and 1893 (Bignell). Battle in

Sussex (Vict. Hist.). I took a single specimen of the female among decaying reeds at Oulton Broad, in Suffolk, at the end of July, 1904; and possess others from Chobham in July (*ex coll.* Marshall), and a long series from Shere in Surrey (*ex coll.* Capron). Chitty has found it at Oxford in October.

21. *formicarius*, Fab.

Ichneumon formicarius, Fab. S. I. p. 441. *Cryptus formicarius*, Fab. Piez. 92. *Pezomachus formicarius*, Gr. I. E. ii. 915; Först. Wieg. Arch. 1850, p. 119; Voll. Pinac. pl. xii. fig. 9; Brisch. Schr. Nat. Ges. Danz. 1881, p. 350, ♀; Thoms. O. E. x. 1004, ♂ ♀. Var. *P. Ratzeburgi*, Först. Wieg. Arch. 1850, p. 119, ♀. *Hemimachus ovatus*, Bridg. Trans. Ent. Soc. 1883, p. 158, ♂.

♀. Head dull, closely and finely alutaceous, with somewhat scattered punctures and short grey pilosity; clypeus more coarsely punctate with lateral foveae and a small apical tooth in the centre; genal sulcus distinct. Antennae with the scape distinctly punctate; basal flagellar joint scarcely longer than the second; the fifth rather longer than broad. Thorax finely alutaceous, closely punctate and dull; mesonotum very short, its basal part bounded in a semicircle by a narrow transverse prominence between the meso- and meta-thorax, and bearing a longitudinal impression; metanotum very short with the petiolar area very large, nearly vertical and apically rugose, with no basal costa; apophyses obsolete and epinemia broad. Scutellum indicated by a narrow, transverse prominence. Abdomen finely and densely punctate and pubescent; petiole very slightly broader at apex than at base, with obsolete spiracles; post-petiole very much broader than apex of petiole and parallel-sided; epipleurae broad; terebra exactly as long as the basal segment, curved and somewhat broad.

Head deep black, with palpi and mandibles piceous and the face often rufescent. Antennae red from base to about the centre and thence darker to the piceous apex. Thorax red with sometimes the mesonotum and usually the metapleurae piceous. Abdomen with the basal segment and rarely the remainder red; usually with the second black, with a somewhat broad translucent red apical margin; the rest black and apically rufescent. Legs rufo-testaceous; the apical tarsal joint brownish at the apex.

♂. Finely and densely reticulate, opaque. Head narrow behind eyes; face slightly protuberant, sub-quadrate, a little longer than wide, sides parallel; cheeks not buccate. Antennae sub-setaceous, about as long as the insect; first and second joints of the flagellum sub-equal, about four times as long as wide. Thorax rather longer than high; mesothorax distinctly trilobed, the depressions reaching to the scutellum; metathorax sub-rugulose, short, without areae, its transverse costa present but feeble. Abdomen with first segment short; petiole scarcely longer than post-petiole, which is sub-quadrate, rather more than twice as wide as the petiole; spiracles very prominent. Abdomen oblong-ovate, rather wider than the thorax, about as long as head and thorax; second and remaining segments transverse, apex of second and third widest. Legs slender. Wings slightly clouded; stigma fuscous and broad; areolet very small and imperfect; basal nervure oblique; with trace of nervelet; nervellus divided about one-third from the bottom.

Black; mouth, base of antennae and legs red; first segment red, base and sides of the petiole dark brown, a fuscous stain across middle of post-

petiole ; second segment red, with a faint fuscous stain across the middle ; third red, with a brown irregular mark across the segment, nearly obliterating the red ; stigma and nervures fuscous ; base of wings pale. Length, $3\frac{1}{2}$ – $4\frac{1}{4}$ mm.

This ♂ appears to differ from *H. rufipes* (*P. cautus*, ♂) in the longer face, the more distinctly trilobed mesothorax, shorter first segment, and wider post-petiole, which, in the latter species, is only one-third wider than the petiole.

The antennae of this species are distinctly incrassate towards their apices.

Förster described his *P. formicarius* from a specimen with the antennae wanting and metathorax mutilated. The variety *Ratzeburgi* appears to differ in the closer puncturation of the head, deeper metathoracic impression, and the prominence of petiolar spiracles.

Professor Thomson named specimens of *P. formicarius*, Grav., taken by Bridgman in the neighbourhood of Norwich (Trans. Ent. Soc. 1886, p. 341) ; and there is one male in the latter's collection there. *Ratzeburgi* is recorded from the Hastings district (Vict. Hist. Sussex). This is probably an uncommon species in Britain, since I possess but single females from Shere in Surrey (Capron) ; Blean Woods in Kent (Chitty) ; Felden in Herts. (Piffard) ; and Buddon Wood (Willoughby Ellis). I swept a male in the Bentley Woods, near Ipswich, on 20th April, 1895. Bridgman took his *H. ovatus* at Brundall, near Norwich, in the middle of September, 1881.

22. *Mülleri*, Först.

Pezomachus Muellieri, Först. Wieg. Arch. 1850, p. 159, ♀. *P. incertus*, Först. lib. cit. p. 160, ♀. [(?) *Hemimachus confusus*, Bridg. Trans. Ent. Soc. 1883, p. 159, ♂.]

♀. Basal flagellar joint slightly longer than the second ; fifth rather longer than broad. Meso- and meta-thorax of equal length ; petiolar area slightly oblique, its basal costa sharply defined and distinct throughout. Abdomen closely punctate and pubescent, scarcely more diffusely towards the apex ; basal segment gradually and evenly contracted throughout, with the apex not broad, its spiracles not prominent ; terebra about as long as the basal segment.

Head dark castaneous ; antennae dark red, with the apex piceous, and the base of the first flagellar joint pale. Thorax red, with its sides and often the metanotum and petiolar area piceous. Abdomen piceous, with the basal segment flavous ; the second entirely translucent red, as also are the apical margins of the remainder ; sheaths of the terebra flavescent. Legs pale red, with the tibiae centrally paler ; the femora and the apical tarsal joint infuscate. Length, $2\frac{1}{2}$ mm.

[? ♂. Whole insect opaque and finely reticulate. Head buccate behind the eyes, a little wider than the thorax. Antennae pilose ; three-fourths of the length of the insect ; joints of flagellum shorter than usual ; first more than three times as long as wide ; second and third sub-equal, shorter than the first ; remainder decreasing in length, but none exactly transverse. Thorax about as long as high ; mesothorax not trilobed ; metathorax short, sloping almost from base to apex ; rough ; no trace of areola ; petiolar area defined at sides only. Abdomen elongate-ovate, covered with dense pubescence ; first segment elongate, tapering from

base to apex ; spiracles more or less distinct ; post-petiole one-half longer than wide ; second segment nearly as long as the width at its apex ; remainder transverse ; third widest. Areolet imperfect ; transverse anal nervure divided one-third from the bottom.

Black ; apex of first segment, base and apex of second, and base of third, reddish ; greater part of front legs, all the tibiae and tarsi, reddish ; stigma fuscous. Length, 3·5-4 mm.

This male is allied to *Pezomachus instabilis*, from which it materially differs in the entire absence of an areola, and in the dense abdominal pubescence. It probably constitutes the unknown ♂ of *P. Mülleri* ; at all events, it appears expedient to here treat it as such. Specimens in Dr. Capron's collection from Surrey very closely resemble *Hemiteles monozonius*, Grav. Four males from a collection belonging to Mr. Marshall.]

The coloration of the ♀ legs is subject to considerable variation.

This species is far less common than *P. intermedius*, with which it is doubtless much mixed in collections, and of which it will very possibly prove to be but a small form, though more elongate and with no trace of a scutellum.

In introducing this female into our fauna, Bridgman says (Trans. Ent. Soc. 1881, p. 156) that it had been taken during 1880 at Weybridge, Leatherhead and Rainham ; and he himself subsequently found it at Mousehold, near Norwich ; Bignell has captured a single specimen at Bickleigh in Devon, early in September (Entom. 1882, p. 45). I have no doubt that *P. incertus* is identical, differing slightly in the development of the transverse metathoracic costa ; it is said (Trans. Ent. Soc. 1881, p. 156) to be not uncommon in Britain and recorded from about Norwich ; several were taken at Headley Lane in 1880 and beaten from whitethorn hedges at Exeter early in September. I have only found it in the Bentley Woods, near Ipswich, in March, April and October, usually, with *P. intermedius* on *Pinus sylvestris*, though occasionally by sweeping low plants at dusk.

23. *vagantiformis*, Bridg.

Pezomachus vagantiformis, Bridg., Trans. Ent. Soc. Lond. 1886, p. 342, ♀.

Head somewhat narrow behind the eyes. Antennae with basal flagellar joint scarcely longer than second and four times as long as wide ; fifth is one-and-a-half times longer than wide. Thorax somewhat elongate, twice as long as high ; the meta- longer and higher than the meso-notum, and both rounded ; no trace of a scutellum ; transverse metathoracic costa present. Abdomen rather narrow, sub-cylindrical, not wider than the head ; pubescence dense and scarcely more scattered at the apex ; punctuation unusually strong ; first segment rather narrow, about two-and-a-half times as wide at the apex as at the base ; spiracles not very distinct, from these to the apex the sides straight and gradually widened ; between the spiracles about twice the width of the base ; remaining segments transverse ; terebra rather longer than the first segment.

Head black. Antennae brown, the apex darker ; second joint and base of third reddish. Pro- and meso-thorax brownish red, metathorax reddish brown, paler in the middle of the back. Abdomen black-brown ; first segment and all margins of second red. Legs red ; apex of posterior

femora, apex and before base of posterior tibiae with a brownish tinge. Length, 4 mm.

Very like *P. vagans* in general appearance ; and apparently closely allied to *P. vulnerans*.

Taken by Dr. Capron in the neighbourhood of Shere, in 1884 ; and subsequently by Bignell at Plympton, towards the end of September. The type of this species, taken in Surrey, is in my collection, and I have seen another specimen taken by Chitty at Doddington in Kent, 31st October, 1904.

24. *distinctus*, Först.

Pezomachus distinctus, Först. Wieg. Arch. 1850, p. 155, ♀.

Flagellum with the two basal joints of equal length ; the fifth somewhat longer than broad. Meso- and meta-thorax of equal length with the petiolar area distinct, its basal costa truncate and centrally depressed ; apophyses strong. Abdomen densely punctate and pubescent on the three basal segments, more diffusely towards the anus ; first segment with no prominent spiracles ; petiole slightly, post-petiole more strongly explanate, but not very broad apically ; terebra as long as the basal segment.

Head black, with the palpi flavous and mandibles black. Antennae piceous, with the three or four basal joints red. Thorax entirely clear red. Abdomen black, with the first segment entirely and the base and sides of the second red ; terebra with the sheaths testaceous, apically piceous. Legs either entirely red-yellow with only the last tarsal joint darker, or with some, or all, of the tibiae infusate at base and apex. Length, 3 mm.

Bridgman introduced this species as British (Trans. Ent. Soc. 1881, p. 155) on the strength of a specimen taken at Mickleham, in October, 1880 (E.M.M. 1881, p. 261), and adds that the legs are coloured as in the form last described above. He subsequently found it at Mousehold near Norwich ; and Bignell has captured it at Bickleigh and Exeter early in September. I possess a single specimen found by Rev. T. A. Marshall at Cornworthy.

25. *analis*, Först.

Pezomachus analis, Först. Wieg. Arch. 1850, p. 170, ♀ ; Thoms. O. E. 1010, ♂ ♀ ; cf. Bridg. Trans. Ent. Soc. 1882, p. 148 (*nec lib. cit.* 1883, p. 161).

♀. Frons alutaceous, dull ; lower face broad ; cheeks smooth ; genal costa almost continuous, sulcus deep ; mandibles scarcely tuberculate at base ; clypeus raised in front, its apex rounded ; vertex broad and deeply emarginate. Antennae rather short ; first joint of flagellum about equal to second and scarcely one-and-a-half times as long as the scape ; fifth longer than wide. Meso- about as long as the meta-thorax ; scutellum indicated ; petiolar area almost vertical, its basal costa sharply defined. Abdomen densely pubescent on the first three segments, more diffusely towards the apex ; first segment moderately broad, its spiracles not projecting ; terebra about as long as the first segment.

Head black. Antennae and thorax red. Abdomen red, with apex of the fourth segment and whole of the following piceous or black. Legs entirely red, last tarsal joint faintly brown.

♂. Winged. Mesosternum saccate; epicnemial slender; petiolar area distinct, its basal costa present. Wings with stigma large but not broad, radius emitted from its middle; parallel nervure from centre of brachial cell; nervellus opposite.

Black, with red coxae and legs. Length, 3-4 mm.

The female differs from *P. mandibularis* in having the antennae and their postannellus shorter, petiole broader, legs slender and central abdominal segments black; the male in having the pronotum and abdomen entirely black. This species may be distinguished from *P. incubitor* in its more vertical petiolar area, stronger basal costa, diffuse pubescence of the apical segments, and in having the fourth always more or less piceous or black.

Bridgman, introducing it as new to Britain, says (Trans. Ent. Soc. 1882, p. 148) that this is not an uncommon species in the neighbourhood of Norwich; Bignell has captured it at Bickleigh and Exeter, in August and September; Luff in the Isle of Herm, and Fitch at Maldon in Essex. Both sexes have been bred from *Zygaena filipendulae* (Entom. 1883, p. 65).

26. *attentus*, Först.

Pezomachus bicolor, var. 3, Gr. I. E. ii. 903. *P. attentus*, Först. Wieg. Arch. 1850, p. 163, ♀. *P. transfuga*, Först. loc. cit. p. 193, ♀. *P. lepidus*, Först. lib. cit. p. 220, ♀.

Antennae with the basal flagellar joint scarcely longer than the second; the fifth longer than broad. Meso- and meta-notum of equal length; petiolar area oblique, with its basal costa distinct throughout, forming a central high and not wide curve. Scutellum wanting. Abdomen closely punctate and pubescent, sometimes more diffusely towards the apex; basal segment very slightly explanate to the not prominent spiracles and thence more strongly to the somewhat broad apex; terebra as long as, or slightly longer than, the basal segment.

Head black; antennae red, with the scape piceous, and sometimes the apices infusate. Thorax red, sometimes with the metapleurae piceous. Abdomen with the two basal segments red, the first sometimes with its sides infusate, the second occasionally with a nigrescent transverse band; the remainder black, with their apical margins more or less indeterminately red; sheaths of terebra piceous. Legs red, with the apical tarsal joint infusate. Length, $2\frac{1}{2}$ - $3\frac{1}{2}$ mm.

I have no hesitation in synonymizing the form *transfuga* with the present species, from which Förster separated it on account of the apically not more diffuse abdominal puncturation, which, as in some forms of *P. carnifex*, has been shown to be an inconstant character. From *P. bicolor*, the present species may be known by its longer terebra, and the coloration of the abdominal segments, of which the second is usually immaculate red. *P. lepidus* is certainly only a form of *P. attentus* with the metathoracic costa centrally contracted and the third segment red.

This species is somewhat poorly figured in "Knowledge," v. p. 288.

Common in Norfolk and bred from the nests of *Agelena labyrinthica* by Marshall (Bridgman); bred in Devonshire from spiders' nests taken out of furze bushes, probably those of *A. labyrinthica* (Bignell); Land's End district (Marquand); occurs in Essex and at Battle in Sussex (Vict. Hist.);

Wymondley in Herts. (Butler). Pickard-Cambridge took both forms, among coarse herbage in Dorsetshire, while searching for spiders (Entom. 1881, p. 137). I have only once met with it, on a sunflower leaf in the garden of Monks' Soham House, Suffolk, early in September; Marshall has given it me from Nunton in Wilts.; Piffard several of both forms from Felden in Herts.; and Evans has sent it from Aberlady and Thorntonloch in East Lothian, captured in March and August. Brandon, Suffolk, by sweeping in a marsh, May, 1906.

27. *tonsus*, Först.

Pezomachus tonsus, Först. Wieg. Arch. 1850, p. 208, ♀; Thoms. O. E. x. 1017, ♂ ♀.

♂ ♀. Cheeks long and full; sulcus indistinct; costa inflexed; mandibles tuberculate at base; vertex broad; clypeus truncate at apex. Antennae short and stout; first joint of flagellum scarcely longer than second; fifth slightly longer than wide. Mesonotum transverse, as long as the metanotum; petiolar area slightly oblique; its basal costa moderately strong above, very prominent at sides. Abdomen finely alutaceous, diffusely punctured and pubescent, almost glabrous; first segment rather narrow at apex, its spiracles not projecting; terebra as long as, or longer than first segment. Legs stout; anterior tibiae inflated; anterior coxae much produced backwards.

Head black or black-brown; palpi yellowish; mandibles dark red. Antennae red to middle, thence darker brownish. Thorax rufo-testaceous, with sides and petiolar area brownish. Abdomen black; segments one to two red. Legs rufo-testaceous. Length, 3-4 mm.

Male apterous.

In both sexes very like *P. acarorum*, but smaller; vertex broader; cheeks longer; abdomen more shining, almost glabrous, and, in female, the terebra longer.

Mousehold near Norwich, females bred from cocoons of *Apanteles congestus*, which were probably parasitic on *Plusia gamma* (Bridgman).

28. *pumilus*, Först.

Pezomachus pumilus, Först. Wieg. Arch. 1850, p. 131, ♀; Thoms. O. E. x. 1006, ♂ ♀. *P. grandiceps*, Thoms. *lib. cit.* 1007, ♂ ♀.

♀. Cheeks short with the sulcus deeply impressed; vertex deeply but not broadly emarginate; clypeus apically truncate. Antennae with the two basal flagellar joints of equal length and the fifth rather longer than broad. Thorax of normal length, with the metathorax decidedly short; petiolar area elongate with its basal costa wanting. Abdomen diffusely punctate and pubescent; basal segment gradually explanate from base to beyond centre and thence more strongly to the moderately broad apex; tubercles wanting, post-petiole quadrate; terebra not longer than the basal segment.

Piceous or black, with the first flagellar joint basally flavous. Legs piceous, with the trochanters, apices of femora, extreme base of tibiae and the tarsi, flavescent; femora in general darker than the tibiae.

♂. Apterous. Mesonotum shining and sub-glabrous, with the petiolar area well-defined. Scutellum distinct, with its lateral margins elevated. Abdomen oblong, nitidulous and sparsely pubescent.

Black, with the legs entirely flavous. Length, 3-4 mm.

Both sexes closely resemble *P. ineptus*, Först., but the female is darker, more shining and diffusely punctate, with the legs not unicolorous; and the male differs in having the petiole shorter, the post-petiole quadrate and the wings not or barely indicated. From *P. nigrilus*, the female may be known by the elongate mesonotum and diffuse puncturation, and the male by its absence of wings. I consider Thomson has quite failed to adduce any specific character for his *P. grandiceps*, unless it be that the post-petiole is slightly more strongly dilated.

Land's End district (Marquand); found among coarse herbage in Dorsetshire (Entom. 1881, p. 137); taken at Oxshott in the middle of October, 1900 (Beaumont); one at Charing in Kent, in May (Chitty). I possess a single pair captured by Piffard at Felden in Herts., and a female which I swept at dusk in a lane at Winterton in Norfolk, in June, 1901.

29. gonatopinus, Thoms.

Pezomachus Gonatopinus, Thoms. O. E. x. 1008, ♂ ♀.

♂ ♀. Head nearly cubical with the face inflexed; genal sulcus wanting, its costa inflexed; eyes sub-circular; mandibles strongly attenuate apically; clypeus apically truncate and sub-marginate, vertex very broad. Antennae filiform and very slender, nearly as long as the body; basal flagellar joint as long as the second, twice longer than the scape and about five times longer than broad; fifth twice longer than broad. Thorax elongate, narrow and compressed, centrally constricted; metathorax convex, with the petiolar area shorter than the metanotum, its basal costa and apophyses wanting; acetabula well defined, epicnemial wanting. Scutellum very conspicuous, triangular and convex, though not basally discreted. Abdomen closely punctate with long dense brunneous pubescence; basal segment short, convex, broad at base and very little broader at apex, almost shorter than the hind coxae, with spiracles sub-prominent; terebra distinctly shorter than the basal segment, its spicula acuminate. Hind tibiae strongly sinuate.

Black; legs piceous with the apices of the femora, base of tarsi and whole of the tibiae bright red; spicula fulvous. Length, 1-2½ mm.

This species resembles *P. anthracinus* in its dark body and long, slender legs, therefore it may be known by its cubical head, centrally constricted thorax, gibbous metanotum, and in the shorter, broader and more convex petiole in both sexes. In size it more nearly approaches *P. intermedius*, from which the shape of the head and colour of the legs materially differ.

I possess a single female of this species, which is new to our fauna, captured by the late Mr. Alfred Beaumont, at Kilmore in Ireland, on 20th August, 1898.

Thomson describes it from Öland, an island off Sweden, in the Baltic Sea.

30. *anthracinus*, Först.

Pezomachus anthracinus, Först. Wieg. Arch. 1850, p. 123, ♀; Thoms. O. E. x. 1008, excl. ♂; Bridg. Trans. Ent. Soc. 1882, p. 147, ♂.

♀. Head with the genal costa inflexed and the sulcus obsolete; eyes sub-rotund; mandibles tuberculate basally, strongly attenuate apically, with acute teeth, of which the upper is the longer; clypeus submarginate and truncate apically; vertex very broad and strongly emarginate. Antennae slender, filiform and as long as the body, basally sub-attenuate; basal flagellar joint about as long as the second; fifth twice longer than broad. Thorax with the mesonotum elongate and longer than the metanotum; petiolar area small, narrow and dull, with no basal costa; acetabula not reaching beyond the centre of mesosternum. Scutellum distinctly indicated. Abdomen closely punctate and pilose; basal segment short and broad, not curved and scarcely longer than the hind coxae, with tubercles indistinct, petiole slightly explanate and post-petiole rather broader, slightly divergent laterally; spiracles of second close to the margins; terebra shorter than the basal segment.

Head, thorax and abdomen black; palpi piceous; apex of second segment and base of the third, with antennal joints, lighter. Legs piceous, with femora and tibiae partly red.

♂. Winged. Head sub-globose, not much broader than thorax; face prominent, separated from clypeus by a distinct impression terminating in lateral foveae; mandibles bidentate, with the teeth sub-equal; vertex finely reticulate. Antennae shorter than body; flagellum sub-clavate, with the basal joint more than twice longer than broad, and a third longer than the second. Thorax finely reticulate with the metathorax rugose, areola indistinct and somewhat semi-oval; lateral areae not discreted; spiracles small and circular. Abdomen with basal segment gradually slightly explanate, aciculate-punctate, with no tubercles; second sub-aciculate and, like the following, punctate; the thyridii distinct, transverse and very large; anal styles prominent. Wings with no areolet and the neuration very imperfect beyond the second recurrent; radial cell short and broad.

Head and thorax black; mandibles and palpi pale ochreous. Abdomen piceous, with the extreme margins of the basal segments flavescent. Legs flavescent, with the hind coxae black, the posterior femora and hind tibiae partly piceous. Wings with the stigma and nervures pale piceous and tegulae flavous. Length, 2–3¼ mm.

Thomson's male is certainly distinct, being apterous with filiform antennae.

The female is distinguished from *P. exareolatus*, Först., which also has a winged male, by the longer antennae, broader vertex, shorter acetabula, dull petiolar area and shorter terebra.

Bridgman tells us (*loc. cit.*) that Fitch bred one male with three females from *Elachista subnigella*. There appear to be no other records of this species, which, however, is not uncommon with us, since I have swept it in boggy places in June, at Barton Mills in Suffolk; and in August at Doddington near Faversham; Elliott has also taken it in August in Tuddenham Fen; and Chitty at Huntingfield in Kent, in May.

56. *intermedius*, Först.

Pezomachus intermedius, Först. Wieg. Arch. 1850, p. 156, ♀. *P. furax*, Först. lib. cit. p. 185, ♀. (?) *P. anguinus*, Först. lib. cit. 1851, p. 39, ♂.

♀. Antennae strongly elongate, with the two basal joints long and subequal; the fifth fully twice longer than broad. Meso- and meta-thorax of equal length; petiolar area somewhat oblique, its basal costa not very strong and sometimes obsolete centrally. Scutellum distinct, though hardly discreted from the mesonotum. Abdomen densely punctate, and very distinctly and closely pubescent to the apex; basal segment gradually explanate with no or hardly any interruption from base to apex, its spiracles not or hardly projecting; terebra as long as the basal segment.

Head black; antennae usually, sometimes broadly, red basally; apically infusate. Thorax red in the type form but usually more or less, sometimes entirely, black. Abdomen black; basal segment often more or less red; second usually with all its margins red, remainder immaculate. Legs red; coxae often black or piceous; femora, apices of tibiae and apical tarsal joint always infusate.

♂. Head black, with mandibles red, genal costa entire; vertex not contracted behind the eyes. Antennae elongate; basal flagellar joint longer than second; fifth fully twice longer than broad; scape and basal flagellar joint testaceous, second apically red, rest piceous. Meso- and meta-thorax of equal length, dark red; pro-, meso- and base of meta-thorax rufescent, with pleurae nearly black; petiolar area sub-vertical, its basal costa normal. Abdomen moderately punctate and pubescent; petiole testaceous with infusate base and apex, spiracles sub-prominent; post-petiole longer than broad, rufescent; second segment with all the margins broadly red, remainder black. Legs red-yellow. Length, $2\frac{1}{2}$ – $3\frac{3}{4}$ mm.

I quite fail to find the least difference between this species and *P. furax*, and Thomson also considered them identical (*cf.* Trans. Ent. Soc. 1886, p. 341), though Förster says the latter has the antennae rather longer, the petiolar area more oblique and terebra shorter. It also resembles *P. sericeus*, Först., from which the long antennal joints differ.

Bridgman says (Trans. Ent. Soc. 1881, p. 155) that the female is far from rare in Britain, and occurs numerously about Norwich, Mickleham and Hastings; he has adopted the above synonymy in his collection, where is a single male example. Beaten from whitethorn hedges at Exminster (Bignell, Entom. 1882, p. 45); occurs in Essex (Vict. Hist.); common at Appledore and Harting (Beaumont); Gifford and Harburn in Midlothian, in April and October (Evans); Surrey (Capron). This species has been noticed by W. Barnes to associate with *Formica sanguinea* about Reading. Tuck has taken it at Finborough Park, Norton Wood and Bungay in Suffolk; Piffard commonly at Felden; Capron at Shere; Marshall at Nunton in Wilts.; W. Ellis at Knowle and in the New Forest; and Newbery at Gwydir near Trefriw, in August. It is excessively abundant on *Coniferae* everywhere, and I have found it during every month of the year but January, in sand-pits, beneath stones, by sweeping herbage and dead reeds, and in tufts of *Aira caespitosa*, in winter, at Bentley Woods, Foxhall, Oulton Broad, Dodnash, Bramford, Felixstowe and Lyndhurst. Charbonnier has sent me two females bred at Publou in Somerset, during

September, from the interwoven cocoons of *Apanteles spurius*, Wesm. *P. anguinus* is recorded from Norwich (Bridgman); St. Leonards and Bo-peep in Sussex (Vict. Hist.); and Piffard has given it to me from Felden in Herts.

31. *vagans*, Oliv.

Ichneumon vagans, Oliv. Encycl. meth. vii. 204. *Pezomachus vagans*, Gr. I. E. ii. 890, excl. varr.; Först. Wieg. Arch. 1850, p. 203; Voll. Pinac. pl. xii. fig. 8, ♀ (*nec* Rosenhauer); Thoms. O. E. x. 1013, ♂ ♀; Bridg. Trans. Ent. Soc. 1883, p. 163. ♂. Var. *P. bicolor*, var. 2, Gr. I. E. ii. 903; *P. latrator*, Först. Wieg. Arch. 1850, p. 215; Ratz. Ichn. d. Forst. iii. 148, ♀. Var. *P. calvus*, Först. Wieg. Arch. 1850, p. 205, ♀; Thoms. O. E. x. 1014, ♂ ♀. Var. *P. vagans*, var. 2, Gr. I. E. ii. 891; *P. discedens*, Först. Wieg. Arch. 1850, p. 204, ♀.

Head with the genal sulcus deeply impressed, its costa continuous and the clypeus apically rounded. Antennae slender, with the basal flagellar joint about as long as the second, and the fifth twice longer than broad. Thorax somewhat elongate; the centrally foveate meso- very slightly longer than the meta-notum; petiolar area oblique and distinct, dull and finely punctate, its basal costa distinct but not prominent laterally; acetabula scarcely extending beyond the centre of the mesosternum. Scutellum very distinctly represented by a prolongation of the mesonotum, from which it is not discreted. Abdomen sub-glabrous and finely reticulate, with short, scattered and erect pubescence; basal segment almost evenly explanate throughout, with the post-petiole sub-transverse and spiracles not or only slightly projecting; terebra about as long as the basal segment. Legs slender, with the front tibiae not inflated.

Head black, with the palpi infusate. Antennae piceous, with the flagellum becoming rufescent towards the base. Pro- and meso-thorax red, sometimes with pleural black markings; metathorax entirely black. Abdomen black with the two basal segments, and more or less of the third, red. Legs testaceous; the hind or posterior more or less infusate or castaneous.

♂. Winged; finely and densely punctate and somewhat dull. Head with the vertex sub-quadrate, anteriorly sub-rotund and broader apically; cheeks slightly rounded but not buccate; clypeus discreted and apically rounded; epistoma protuberant, frons centrally canaliculate. Antennae as long as the body, slender, slightly incrassate before the centre and apically attenuate; two basal flagellar joints of equal length, the first about four times longer than broad, the ninth and tenth externally emarginate. Thorax elongate, about a third longer than high; mesothorax apically discally foveate, with faint notauli; metanotum with no areae; petiolar area sub-oblique, its basal costa strong. Abdomen with the basal segment about as long as the hind coxae, with somewhat prominent spiracles; post-petiole not broad; the second sub-quadrate and coarsely punctate; remainder transverse; the fourth and following with short and scattered pilosity. Legs slender. Wings of normal length, but narrow; stigma elongate and not broad, emitting the radius from its centre; areolet pentagonal with the outer nervure wanting; nervelet wanting; nervellus opposite and not intercepted.

Black, with the second, third and apex of the first segments red. Legs pale red, with the hind femora and tibiae piceous, and the intermediate also in a less degree; tarsi infusate. Wings hardly infumate with the

nervures and stigma piceous, the latter basally white ; radix pale. Length, 3-3½ mm.

The variety *latrator* appears to me to be certainly synonymous, differing only in having the metathorax nearly entirely red, and the fifth flagellar joint is described as nearly quadrate¹; it is quite possible that *P. callidus* and *P. hostilis* are only forms of this variety. Both sexes of the variety *calvus* differ only in having the thorax black, with only the pronotum and a radical spot red, the coxae and hind legs somewhat darker ; the abdomen is said to be more nitidulous and the general colour darker ; Thomson's two descriptions tally almost verbatim. The typical ♀ is said to be closely allied with that of *P. fasciatus*, from which it differs in the sub-transverse post-petiole, shorter terebra, apically black abdomen, and in the usually black metathorax. The conformation of the antennae renders the ♂ very distinct.

For dissections of this species confer Curtis' Brit. Ent. pl. 536.

Ratzeburg bred the variety *latrator* from spiders, and Bridgman both typical sexes from a spider's nest (Ent. 1882, p. 239), in the middle of July at Wimbledon ; these are represented in his collection at Norwich, and he subsequently took it at Buckenham in the Norfolk Broads. I have swept the female in very marshy spots at Foxhall, Tuddenham Fen, Oulton Broad, and an alder wood in the Bramford Marshes, in Suffolk, in May, August, September and November ; and possess three examples from Shere in Surrey, in Capron's collection. The commonest British form appears to be *discedens*, which I have swept at Ranworth Broad in June and at Claydon bridge as late in the year as 25th November ; once I took it running on the mud, among *Steni* and *Tregophloeï*, at the roots of reeds by the Little Ouse at Brandon, in Suffolk ; Tuck has sent it me from Bungay, in October. Förster says it differs from *vagans* in its shorter body, narrower thorax, less developed scutellum, and the non-projecting petiolar spiracles ; the only distinction I can trace is in its entirely red third segment, with the base and sides of the fourth and base of the metathorax also red ; it appears intermediate in colour between the type form and the variety *latrator*.

32. *fraudulentus*, Först.

Pezomachus fraudulentus, Först. Wieg. Arch. 1850, p. 162, ♀.

Head dull with sparse grey pilosity ; occiput distinctly bordered throughout. Antennae somewhat short and stout, with the basal flagellar joint rather longer than the second, and the fifth a little longer than broad. Thorax hardly shining ; meta- distinctly longer than the meso-notum ; petiolar area sub-vertical and not elongate, its basal costa sometimes obsolete centrally, but with the apophyses prominent though obtuse. Scutellum wanting. Abdomen densely punctate and pubescent to the apex ; basal segment not short, equally and gradually explanate throughout, with the spiracles not prominent ; terebra as long as the basal segment. Legs somewhat stout.

Head black with the palpi and mandibles red. Antennae somewhat dark red with the apical half of the flagellum piceous, the scape infusate,

¹ A somewhat doubtful female of *P. fuscicornis*, Först., captured by Mr. F. H. Day in the Carlisle district in the middle of February, 1900, has passed through Elliott's hands ; it is said to differ from *P. vagans* in having the fifth flagellar joint not longer than broad.

and the base of first flagellar joint flavescent. Thorax deep red with the pleurae narrowly black below. Abdomen with the two basal segments clear red, the second sometimes with a piceous central mark; remainder suddenly black, with the apical margins obsoletely rufescent. Legs red; apical tarsal joint and the hind femora castaneous. Length, 4 mm.

This species has not before been noticed in Britain, though probably not rare here. Butler first took it at Chobham in September, 1892; he has also found it at Dallington Forest (*cf.* Vict. Hist. Sussex). I possess several examples in Piffard's collection, taken at Felden in Herts.; from Edward Saunders, from Bury St. Edmunds; Newbery, from Hampstead, in July; Capron from Shere; and Bennett from flood refuse at Wittersham, in Kent. Chitty took it at Oxford in October, 1905. I swept a specimen from reeds in the Southwold salt marshes at the end of September, and took another on herbage in a marshy spot at Claydon, in June.

33. *impotens*, Först.

Pezomachus hortensis, var. 6, Gr. I. E. ii. 910, ♀. *P. impotens*, Först. Wieg. Arch. 1850, p. 221, ♀.

♀. Antennae with first joint of flagellum slightly longer than second; fifth almost quadrate. Meta- distinctly longer than the meso-thorax; costa of petiolar area fine, not prominent, and only slightly projecting below. Abdomen very shining, punctuation diffuse and pubescence short; first segment with distinctly projecting spiracles, its apex rather narrow; terebra not quite as long as first segment.

Head deep black; antennae red to middle, thence darker to the brown apex; the scape also brown. Thorax red; base of mesothorax, petiolar area near insertion of petiole, and the sternum round the middle and hind coxae, blackish. Abdomen with first segment red; second red, with a more or less distinct basal brownish transverse band; three to six black, the apex of sixth and whole of seventh reddish. Legs red; all femora with apical half brownish; the tibiae less distinctly brown at apex only, and the last tarsal joint brown. Length, 3-4 mm.

The female has a strong superficial resemblance to *P. inermis*, but is distinguished by the much longer metathorax, stronger ridge, as well as by the projecting spiracles and narrow apex of first segment.

♂. Head transverse, entirely black, very closely shagreened and dull; vertex somewhat narrow and not emarginate, rounded behind the eyes; clypeus discreted and apically rounded; face longitudinally prominent, callose beneath each scape. Antennae filiform, slender and as long as the body, black with the first flagellar joint basally rufescent and only slightly longer than the second. Thorax dull black, notauli distinct but not basally coalesced; mesonotum deplanate; metanotum completely areated with only the costulae sub-obsolete; areola sub-pyriform and longer than broad, apophyses small and acute. Abdomen black, elongate-ovate, very sparsely pubescent and dull, with the anus more shining; basal segment thrice length of its apical breadth, spiracles obsolete, post-petiole hardly broader than the petiole and not at all explanate; its extreme apex, whole of the second except a broad determinate central transverse fascia, and the basal angles of the third segment, brick-red. Legs red with the posterior coxae, hind femora and apices of their tibiae, black. Wings slightly

clouded; stigma broad and piceous, with its base and the tegulae white; basal nervure strongly curved, areolet externally and the nervelet wanting; nervellus antefurcal. Length, 4 mm.

The only record of this species as indigenous that I can find is that of a single female captured by Bridgman at Earlham in Norfolk, in July. Sich has very kindly sent me a pair of this species which he bred in 1905 from two larval cases of *Coleophora saturatella*, found near London; these gnawed an exit through roughly circular holes, the one near the apex, the other near the base of the case, whence the moth always emerges at the very apex without injuring the case in any way. This is probably the species referred to at Ent. Ann. 1861, p. 41: "An apparently new species (of *Pezomachus*) was bred from *Coleophora saturatella* by Mr. Scott"; and indeed the male is now for the first time here described; the type is in my collection. It would, Mr. Sich suggests, be interesting to know if the parasite pierces the larva through its case or enters the latter for that purpose; in this instance it is certainly a direct parasite. Further, I possess a very remarkable example of the female which was bred by Godfrey from the false scorpion, *Chthonius Rayi*, Koch, at Edinburgh in 1903; this has the right compound eye broadly separated into two parts, the lower, which attains only its normal distance from the mandibles, is very small and deplanate; but the upper, which rises so high as to render the vertex uneven and the ocelli uncentral, is large, convex, and very strongly protuberant; one might imagine Chernetidous diet too nourishing! I have seen a female of this species captured by Evans at Aberlady in East Lothian, which has unusually pale antennae, and very probably constituted *P. consociatus*, Först.; in all other features, however, it is quite typical.

34. *timidus*, Först.

Pezomachus timidus, Först. Wieg. Arch. 1850, p. 128, ♀. *P. fuscus*, Först. loc. cit. 1851, p. 35, ♂.

♀. Antennae with first joint of flagellum slightly longer than second; fifth decidedly longer than wide. Thorax rather short; meso- and metanotum of equal length; petiolar area nearly vertical, with its basal costa entirely wanting. Abdomen moderately closely punctured and pubescent; first segment narrow, very slightly widened to the spiracles, which lie behind the middle and do not project, beyond them slightly more, but still narrow at the apex. Terebra rather shorter than the first segment.

Head black; antennae brown, with extreme base of flagellum paler, yellowish. Thorax dark chestnut brown. Abdomen with first segment pale yellow; second brownish; the remainder black-brown. Legs yellow; femora brownish, with base and apex lighter; outer side of tibiae also with a brownish tinge. Length, 2 mm.

♂. Apterous. Head dark piceous or black, with the mandibles except at apex red. Antennae dark castaneous, with the apex of the scape and extreme base of flagellum fulvous; basal flagellar joint only slightly longer than the second; fifth less than twice longer than broad. Pro- and meso-thorax piceous, metanotum black; petiolar area with a distinct costa which is centrally depressed and laterally acute. Scutellum distinct. Abdomen closely punctate and pubescent to the apex, piceous;

second and third segments more or less flavidous ; the first with prominent spiracles, basally broad, the petiole slightly explanate, post-petiole broader, with sub-parallel sides and very broad apex. Legs piceous with trochanters, base and centre of tibiae, and the tarsi fulvous ; hind legs darker. Length, 2 mm.

This species was introduced as British by Marshall in 1870 ; and Bridgman took a somewhat doubtful female at Norwich (Trans. Norf. Soc. 1893, p. 616). I found a specimen, certainly referable to it, in a rabbit's hole on a sandy heath at Staverton in Suffolk, on 24th June, 1903. The male has not before been associated with this species, nor noticed in Britain ; I secured a specimen, certainly referable to *P. fuscus*, in a rabbit's hole on the same sandy heath at Staverton, on 22nd June, 1904.

35. *bicolor*, Grav.

Pezomachus bicolor, Gr. I. E. ii. 902, excll. ♂, varr. et synon. ; Ratz. Ichn. d. Forst. i. 154, cf. iii. 147 ; Först. Wieg. Arch. 1850, p. 174, ♀.

Head shortly pubescent and finely coriaceous. Antennae stout and not elongate ; two basal flagellar joints of equal length, the fifth longer than broad. Thorax short, with sparse but distinct pubescence ; meso- and meta-notum of equal length ; petiolar area vertical, its basal costa strong and laterally obtusely prominent. Scutellum indicated. Abdomen densely punctate and pubescent to the apex ; basal segment somewhat broad with the post-petiole quadrate, its spiracles always more or less projecting ; terebra distinctly shorter than the basal segment. Legs normal.

Head and antennae deep black ; the latter with the scape infusate and three basal flagellar joints dull red. Thorax pale red. Abdomen black, with the first segment entirely and the lateral margins of the second broadly red ; remainder with the apical margins of the segments narrowly pale. Legs red, with the apical tarsal joint infusate. Length, $3\frac{1}{2}$ mm.

Superficially it much resembles *P. circumcinctus* and *P. cautus*, but the metathoracic transverse costa is stronger, the petiolar spiracles more prominent and the antennae shorter. Hartig (Jahresb. 1837, p. 253) says the ♂ is winged, as might be expected from the ♀ scutellum, but I do not know if it be described.

I have taken this species, which appears to be very uncommon with us, at Felden in Herts., in August ; and possess others bred by Beaumont from the chrysalis of a species of *Depressaria* at Appledore in Kent, in October, 1900, and captured by him at Church Stretton, in August. Chitty has found it at Huntingfield and Doddington in Kent. Both sexes are said by Laboulbène to have been bred by Giraud from the galls of *Cynips rhizomae*, in France.

36. *ochraceus*, Först.

Pezomachus ochraceus, Först. Wieg. Arch. 1850, p. 159, ♀. (?) *P. procursorius*, Först. lib. cit. 1851, p. 42, ♂.

Flagellum with first joint distinctly longer than second ; fifth longer than wide. Meso- and meta-notum of equal length ; petiolar area almost vertical ; its basal costa distinct throughout, and forming a high, narrow

curve in the centre. Abdomen moderately closely punctured and pubescent throughout; petiole somewhat narrow at base, longer than post-petiole, which has parallel sides; spiracles somewhat projecting. Terebra scarcely as long as the first segment.

Head black; antennae red, infusate towards apex. Thorax red. Abdomen with segments one to three yellow, the rest red-yellow; segments one to four with a fine brown transverse line near apex and darker apical margin; sheaths of terebra yellow, apically brown. Legs red. Length, $2\frac{3}{4}$ mm.

This ♀ differs from *P. corruptor* in the shorter metathorax, the shape of the first abdominal segment, and in the colour of the sheaths of the terebra, as well as in the more vertical petiolar area, the narrower and more parallel-sided post-petiole, which has the spiracles more prominent, and in the less distinctly punctate anus.

? ♂. Apterous. Head black, palpi and mandibles testaceous, latter apically black. Antennae pale red, hardly darker apically; basal flagellar joint slightly longer than second; fifth twice longer than broad. Petiolar area very high, its basal costa centrally truncate, laterally convergent; apophyses prominent; mesonotum pale red, its pleurae and metathorax piceous; petiolar area red. Scutellum distinct. Abdomen densely punctate throughout, slightly more diffusely at apex; three basal segments pale red, the first basally piceous, and the third with a piceous basal fascia; first segment with petiole little explanate and the post-petiole parallel-sided, with distinct but not prominent spiracles. Legs fulvous. Length, 3 mm.

This male is but tentatively here placed, since it appears to bear to *P. ochraceus* much the affinity that *P. dysalotus* does to *P. corruptor*. Bignell captured it at Bickleigh in the middle of September, and it has been bred from *Microgaster* cocoons (Entom. 1881, p. 139).

If this insect really be but a form of *P. corruptor*, which I do not credit, it is very much rarer than the typical one, for I have never met with it in Suffolk. Bridgman, however, says it is common in Norfolk; Fitch has found it at Maldon in Essex; Capron in Surrey; and Butler at Battle in Sussex. I, too, have found it in a tuft of *Aira caespitosa* at Brede, near Hastings, late in March; and swept it at Hursthill, in the New Forest, early in August; Donisthorpe has given me an example captured at Dorking, in 1894; and Evans took it at Inveravon, in Linlithgowshire, in February, 1903.

37. *modestus*, Först.

Pezomachus vagans, varr. 1 et 4, Gr. I. E. ii. 891, ♀. *P. modestus*, Först. Wieg. Arch. 1850, p. 154, ♀. *P. striolatus*, Ratz. Ichn. d. Forst. iii. 146, ♀. *P. providus*, Först. Wieg. Arch. 1850, p. 187, ♀. (?) *P. ageletes*, Först. loc. cit. 1851, p. 51, ♂.

Head normal; first flagellar joint slightly longer than the second, the fifth longer than broad. Meta- somewhat longer than the meso-thorax, compressed laterally and therefore narrow discally, somewhat shining with very scanty pubescence. Abdomen closely punctate and pubescent, especially basally; first segment with no projecting tubercles; terebra about as long as the basal segment.

Head black; antennae piceous, with the base of the first flagellar joint dull red-yellow. Thorax pale brown. Abdomen black or black-brown,

with the basal segment distinctly paler, the second usually red-yellow at all its margins, and the remainder faintly flavescent apically. Legs fulvous, with the apical tarsal joint and claws piceous. Length, $2\frac{1}{2}$ -4 mm.

?♂. Apterous. Head black, palpi flavescent and mandibles basally red. Antennae with the three basal joints fulvous, the fourth darker and remainder gradually becoming piceous; first flagellar joint about as long as the second; fifth fully twice longer than broad. Thorax black, with the metanotum except discally, and the discreted scutellum, red; petiolar area somewhat high, its basal costa distinct and forming a slightly depressed and rather narrow central curve; apophyses unusually prominent. Abdomen black, with the three basal segments closely punctate and red, with the base of the first and second, and most of the third, black; basal segment equally and slightly explanate throughout, with the apex narrow and tubercles wanting; remainder faintly flavescent apically. Legs somewhat pale fulvous. Length, 4 mm.

The female is said to differ from *P. providus*, which has the petiolar area sub-oblique, in the longer metathorax and the less dense pubescence; the colour of the thorax is also more uniform. Till more fully diagnosed, however, these trifling distinctions can hardly be considered sufficient to accord the latter specific rank.

[There can, I think, be no doubt that Ratzeburg's species is synonymous, though his description is somewhat meagre: Antennae somewhat long; first and second flagellar joints of equal length, the second longer than broad; entirely red-brown, except the extreme apex. Thorax red, piceous above the coxae, with the petiolar area basally only weakly costate. Abdomen closely pubescent on the three basal segments, more sparsely towards the apex; mostly, except the basal segment, dark; terebra as long as the basal segment. Legs (probably) red. Length, $1\frac{1}{2}$ lines.]

P. modestus is a very abundant species in the spring and autumn. I have records from Bungay, Tostock and Finborough Park, in Suffolk (Tuck); Box Hill, Oxshott and Cobham (Beaumont); Oxford, Charing and Doddington in Kent (Chitty); Church Stretton and Harborne (W. Ellis); Felden in Herts. (Piffard); Cromer (Elliott); Isle of Mull (Tomlin); Hillend, near Edinburgh (Evans); Shotover, near Oxford (Hamm); and have taken it myself by beating juniper at Chipperfield Common in Herts.; poplar in Assington Thicks, in Suffolk; in moss in the Bentley Woods near Ipswich, and Guestling Wood near Hastings; swept it from dead reeds at Foxhall; and found it in tufts of *Aira caespitosa* at Peppering, in Sussex. Ratzeburg bred his species from *Tortrix piceana*, and adds that it was "probably parasitic on a parasite of a parasite."

38. *agilis*, Grav.

Pezomachus agilis, Grav. I. E. ii. 894, ♂ ♀; Först. Wieg. Arch. 1850, p. 171, ♀; Thoms. O. E. x. 1016, ♂ ♀. *P. spurius*, Först. Wieg. Arch. 1850, p. 194, ♀.

♀. Genal costae inflexed and their sulcus nearly obsolete; mandibles basally tuberculate; clypeus apically truncate and not elevated. Antennae short and stout; basal flagellar joint longer than the second, the fifth very slightly longer than broad. Thorax short with the mesonotum transverse and shorter than the metathorax; petiolar area oblique, its basal costa centrally obsolete, apophyses strong though obtuse; acetabula occupying

nearly all the mesosternum. Abdomen densely pubescent to the apex ; post-petiole of normal breadth, with the spiracles not prominent ; terebra shorter than the basal segment. Legs stout ; the front tibiae inflated and their coxae produced nearly to the base of the intermediate.

Head black ; antennae red to their centre and thence gradually darker to the apex. Thorax piceous or black. Abdomen black with the apex of the post-petiole and sides of the second and third segments red ; the first sometimes entirely black or the apical margins of the following rufescent. Legs red.

♂. Brachypterous. Thorax somewhat elongate ; scutellum tuberculi-form ; wings punctiform. Black with the antennae red. Abdomen with the apex of the post-petiole, and sometimes also the second and base of the third segments, red. Legs red with the posterior femora and apex of their tibiae black. Length, 3 mm.

There can, I think, be no doubt that *P. spurius* is nothing but a small and weakly developed form of this species, since it has the stout flagellum, short antennae, transverse mesonotum, oblique petiolar area, centrally obsolete and laterally strong basal costa, and the coloration of the type form, from which it differs only in its smaller size and more diffusely pubescent abdomen.

Professor Thomson confirmed this species as British in 1886 (Trans. Ent. Soc. p. 341), on the strength of a single male, taken by Bridgman in Norfolk. Bignell has found it at Exeter early in September. It is said to be abundant at Glanvilles Wootton by Dale, who records it from Harris in the Outer Hebrides (E.M.M. 1883, p. 237), and common in Guernsey, by Luff. Beaumont has captured the male at Harting and females at Oxshott, Boxhill, and Appledore. It has been bred by Ratzeburg from a *Coleophora* on beech ; by Brischke through *Microgaster glomeratus* from *Pieris brassicae* and, Kirchner says, *Psyche calvella* ; according to Wasmann it is also an inquiline in the nests of *Lasius fuliginosus*. It does not appear to be very common with us ; I possess examples from Felden in Herts. (Piffard), Birch Wood and Leicester (Marshall), and Shere in Surrey (Capron). Chitty has found it in Kent at the Blean Woods, Charing, Huntingfield, Doddington ; and at Bradfield, near Reading, in September and April.

39. pulicarius, Fab.

Ichneumon pulicarius, Fab. E. S. ii. 191. *Pezomachus pulicarius*, Gr. I. E. ii. 917 ; Först. Wieg. Arch. 1850, p. 144 ♀ ; Bridg. Trans. Ent. Soc. 1889, p. 418, ♂. (?) *P. lustrator* et *P. secretus*, Först. Wieg. Arch. 1851, pp. 38 et 59.

♀. Head finely alutaceous, moderately closely but not very distinctly punctured, and with very short pubescence ; vertex rather strongly convex. Antennae short, not more than half the length of the insect ; first flagellar joint distinctly longer than second ; fifth longer than broad ; the eighth quadrate. Mesothorax shorter and less convex than the metathorax ; scutellum distinctly indicated ; petiolar area low and short, much shorter than the metanotum ; its basal costa present but weak, and only distinct at the sides, though a trace may be seen above in a very good light. Abdomen with moderately close pubescence ; first segment relatively short, strongly expanded towards the apex ; spiracles not projecting ; terebra shorter than first segment.

Head black ; mandibles and palpi red. Antennae dark, dull red-brown. Thorax and legs red ; femora black. Abdomen with first segment red, the rest black, sixth and seventh sometimes with a fine pale yellow posterior margin.

♂. Sub-opaque, finely granulate ; head rather stout, slightly contracted behind the eyes, rather wider than the thorax. Antennae as long as the body ; first joint of the flagellum about four times as long as wide, longer than the second. Clypeus somewhat distinctly separated from the face, rounded at the apex ; space between the eyes and mandibles about equal to the width of the base of the latter ; face transverse, rather prominent in the middle. Thorax longer than high ; notauli faintly impressed in front ; scutellum somewhat gibbose, suture at the base finely consute ; meta-thorax a little longer than wide, with only a faintly defined areola, which is about as broad as long ; the metanotum separated from the petiolar area by an angulated ridge. Abdomen elongate-ovate ; first segment rather narrow, without projecting spiracles, only about one-fourth narrower at the base than at the apex, sides more parallel and the base wider than usual ; second segment about as long as wide ; remainder transverse ; apex of third widest and as wide as the thorax. Legs slender. Wings with a pentagonal areolet ; its outer nervure absent ; cubital nervure with one, and recurrent nervure with two, clear spots ; stigma triangular, about one-third longer than wide ; radial cell rather short, outer nervure slightly curved, exterior inferior angle of discoidal cell rectangular ; transverse anal nervure antefurcal, distinctly divided one-third below the centre.

Black ; apex of first segment and base of third narrowly yellowish red, the second yellowish red, with a large black central blotch, leaving only a narrow pale border all round the segment. Legs black ; base of front tibiae and joints of tarsi piceous ; middle and hind legs, apex of trochanters, base of tibiae, and base of joints of tarsi piceous. Tegulae and nervures blackish brown. Stigma black, white at its base. Wings slightly fuscous, with a white patch just below the stigma. Length, $4\frac{1}{2}$ –6 mm.

I am certainly of the opinion that *P. lustrator* is an apterous dimorphic form of this male, and quite possibly *P. secretus* is the same ; both have been recorded from Britain, though I have not met with them, and no localities are forthcoming.

Both sexes bred by Mr. B. A. Bower from British *Coleophora vibicella* (Bridg. *loc. cit.*).

40. *tristis*, Först.

Pezomachus tristis, Först. Wieg. Arch. 1850, p. 153, ♀. *P. violentus*, Först. *lib. cit.* 1851, p. 59, ♂.

♀. Flagellum with the basal joint slightly longer than the second ; the fifth longer than broad. Meta- rather longer than the meso-thorax ; petiolar area nearly vertical, its basal costa weak, though slightly stronger laterally. Abdomen moderately closely punctate and pubescent ; basal segment gradually explanate throughout, with the sides straight and the spiracles not or only slightly prominent ; terebra a little shorter than the basal segment.

Head piceous ; antennae fulvous, slightly darker only towards the apex. Prothorax dark red ; meso- and meta-thorax piceous, dorsally rufescent.

Abdomen piceous with the basal segment apically, and the three following laterally, translucent red ; terebra with its spicula flavous and sheaths ferrugineous. Legs flavous, with the apical tarsal joint only slightly infusate.

♂. Head not contracted behind the eyes, black ; clypeus discreted, rufescent ; palpi dull flavidous ; mandibles testaceous, apically piceous. Antennae piceous with the three basal joints clear fulvous, and the fourth basally pale ; first and second flagellar joints sub-equal in length ; the fifth about twice longer than broad. Metathorax somewhat elongate ; petiolar area short and nearly vertical, its basal costa and apophyses distinct ; colour of thorax variable, from testaceous with the notum and pleurae darker to dark brown-red with the notum red ; meso- always lighter than the meta-thorax. Scutellum distinctly discreted. Abdomen with normal puncturation and pubescence ; basal segment varies in colour from pale to dark testaceous, post-petiole sub-quadrate, spiracles more prominent in the darker examples ; fourth segment either entirely rufo-testaceous or brown-red with paler sides and apex ; remainder dark ferrugineous or black, the third sometimes laterally paler. Legs clear testaceous ; hind femora and tibiae more or less infusate. Wings entirely wanting. Length, 4-6 mm.

Bred from *Chelonia villica*, hyperparasitic through *Apanteles ruficornis*, Marshall, 3rd July, 1890. A hundred and seventy-seven larvae of the *Apanteles* emerged from the single caterpillar of *C. villica*, from which developed sixty-four male and one female *Hemiteles fulvipes*, together with six males and two females of *P. tristis* (cf. Bignell, Trans. Devon. Assoc. 1898, p. 474).

41. carnifex, Först.

Pezomachus carnifex, Först. Wieg. Arch. 1850, p. 148 (supra), ♀. *P. rufulus*, Först. lib. cit. p. 148 (infra), ♀ ; Thoms. O. E. x. 1009, ♂ ♀. *P. lutescens*, Först. Wieg. Arch. 1850, p. 161 ; *P. helvolutus*, p. 165 ; *P. emarcidus*, p. 166 ; *P. scitulus*, p. 167 ; *P. juvenilis*, p. 168 ; *P. debilis*, p. 168 ; *P. unicolor*, p. 177 ; *P. venustus*, p. 181 ; *P. consobrinus*, p. 181 ; *P. lividus*, p. 182 ; *P. languidus*, p. 183 ; *P. curvens*, p. 183, ♀. *P. subtilis*, Först. lib. cit. 1851, p. 33, ♂. *Heminachus annulicornis*, Bridg. Trans. Ent. Soc. 1883, p. 160, ♂.

♀. Frons dull and finely reticulate ; face broader below ; cheeks smooth, with the costa continuous and sulcus deeply impressed ; mandibles hardly tuberculate basally ; clypeus elevated in front and apically rounded. Antennae with the basal flagellar joint more or less distinctly longer than the second, and half as long again as the scape ; the fifth somewhat longer than broad. Mesothorax longer than the metanotum in the type form, but usually about equal in length ; petiolar area well defined, smooth and shining, with its basal costa distinct though variable in development ; mesonotum sometimes with a depression in front, and metanotum longitudinally impressed ; acetabula occupying nearly the whole mesosternum. Scutellum usually indicated by a tubercle or transverse callosity. Abdomen closely punctate and pubescent at the base, though often more diffusely towards the apex ; petiole elongate, post-petiole not transverse, with the spiracles only slightly projecting ; terebra as long as, or shorter than, the basal segment. Legs normal, anterior tibiae not inflated.

Rufo-testaceous, with the head sometimes darker than the thorax. Abdomen with the two or three basal segments paler than remainder, which are often piceous. Legs uniform testaceous, with only the apical tarsal joint usually darker.

♂. Head sub-globose and much broader than the thorax. Antennae slender and somewhat longer than the body; basal flagellar joint five times longer than broad and somewhat longer than the second, the remainder decreasing in length with none quite quadrate. Thorax narrow and about a third longer than high; notauli wanting; metanotum slightly longer than the petiolar area, the basal costa of which is distinct; areola wanting, mesosternum saccate, epicnemial slender. Abdomen about as broad as thorax; basal segment somewhat elongate, gradually explanate to the spiracles and thence parallel-sided, with the post-petiole not quite half longer than broad; second segment a third longer than broad; the remainder transverse, the fourth the widest. Wings vary from normally developed to more or less abbreviated, though never wanting; the venation towards the apex imperfect; stigma large though not broad, emitting the radius from its centre; nervellus opposite.

Head black, with base of antennae more or less red or piceous. Thorax pale piceous, with the pronotum sub-testaceous; abdomen black, with the first two, and greater part of the third, segments ochraceous or rufescent. Legs of the same colour, as also are the stigma and nervures. Length, 2-5 mm.

The more or less essential ♀ varieties, which have been described as good species, may be briefly referred to as follows:—

i. *Abdominal puncturation more diffuse apically; terebra longer.*

RUFULUS. Head not darker than thorax; meso- longer than meta-thorax; petiolar area slightly oblique with its basal costa sharp; petiolar spiracles not prominent, basal segment apically of normal width; two basal segments flavous, rest darker. Length, 1-2 lines.

LUTESCENS. Head darker than thorax; meso- and meta-thorax of equal length; petiolar area oblique, its basal costa sharp; basal segment apically narrow; the third and fourth segments piceous, with lighter apical margins. Length, $1\frac{1}{3}$ lines.

EMARCIDUS. Head not darker than the thorax; meso- shorter than meta-thorax; petiolar area vertical, with its basal costa weak; basal segment normally broad apically; two basal segments with base of the third lighter. Length, $\frac{3}{4}$ line.

JUVENILIS. Head darker than thorax; antennae elongate stout; meso- and meta-thorax of equal length; petiolar area oblique, with its basal costa strong; basal segment apically narrow; segments three and four piceous. Length, 1 line.

DEBILIS. Head darker than thorax; antennae elongate; meso- and meta-thorax of equal length; petiolar area low and nearly vertical, its basal costa strong; basal segment apically narrow; basal segment entirely and the second basally flavous, rest castaneous. Length, $\frac{3}{4}$ line.

HELVOLUS. Head darker than thorax ; meso- and meta-thorax of equal length ; petiolar area vertical, its basal costa sharp ; basal segment normally broad apically ; three basal segments fulvous, remainder piceous. Length, $1\frac{1}{2}$ lines.

SCITULUS. Head variable ; meso- and meta-thorax of equal length ; petiolar area high, broad and vertical, its basal costa weak ; basal segment with distinct but not prominent spiracles ; two basal segments and base of third paler than rest. Length, $\frac{3}{4}$ line.

ii. *Abdominal puncturation uniform throughout ; terebra shorter.*

UNICOLOR. Two basal flagellar joints, and meso- and meta-thorax, of equal length ; petiolar area oblique, basal costa sharp ; terebra half length of basal segment, spiracles prominent ; antennae unicolorous flavous ; base and apex of abdomen darker. Length, 1 line.

VENUSTUS. Basal flagellar joint longer than second ; meso- and meta-thorax of equal length ; petiolar area oblique, its basal costa sharp ; spiracles of first segment not projecting. Colour as in *unicolor*. Length, $1\frac{1}{4}$ lines.

CONSOBRINUS. Two basal flagellar joints, and meso- and meta-thorax, of equal length ; petiolar area high and oblique, basal costa weak ; colour as in *unicolor*, but anus darker, sub-castaneous. Length, 1 line.

LIVIDUS. Basal flagellar joint longer than second, and meso- than meta-thorax ; petiolar area deplanate and broadly impressed, basal costa strong ; head and anus castaneous, thorax and two basal segments testaceous. Length, 1 line.

LANGUIDUS. Like *consobrinus*, but meta- longer than meso-thorax ; petiolar area sub-vertical, its basal costa strong though sub-obsolete centrally ; pale castaneous with first segment flavous, second rufescent, fourth and fifth darkest. Length, 1 line.

CURRENS. Basal flagellar joint longer than second ; meso- and meta-thorax of equal length ; petiolar area only slightly oblique, basal costa strong throughout ; head dark castaneous ; thorax and legs fulvous ; basal segment testaceous with distinct spiracles, rest darker. Length, $1\frac{1}{4}$ lines.

This is an extremely abundant species throughout the whole year. Bignell records the typical form from Exminster and Bickleigh in September. The form *rufulus* is not uncommon at Felden in Herts. in August (Piffard) ; Botusfleming in Cornwall (Marshall) ; Finborough Park in Suffolk (Tuck) ; common in Norfolk (Bridgman) ; and at Bickleigh in September (Bignell) ; Battle in Sussex (Vict. Hist.) ; several at Oxshott, Harting and Appledore in Kent, in August (Beaumont) ; I have rarely beaten it from pine trees at Foxhall, near Ipswich, in September. The form *lutescens* has not hitherto been noted in Britain, though very abundant with us ; Piffard has found it commonly at Felden in Herts. ; Beaumont at Courten and Kilmore in September ; and at Mathon and Harting in August ; Edward Saunders took it at Ilfracombe in October, 1889 ; Marshall at Cornworthy ; Tuck at Southwold and Bungay in Suffolk ; and it has occurred to me commonly at Ipswich in July, and on

pine trees in the Bentley Woods early in April. In introducing the form *juvenilis* as a good species, new to our fauna, Bridgman records it (Trans. Ent. Soc. 1881, p. 156) from the Mickleham valley in October, and commonly in the neighbourhood of Norwich in September, 1880; later (*loc. cit.* 1886, p. 341) he adds Thomson's opinion that it is only a variety of *P. rufulus*; it has also been found in the Land's End district by Marquand, and Elliott has examined a female taken by Day about Carlisle, early in October, 1899. *Debilis* is an abundant, though hitherto unnoticed, British form; taken by Piffard at Felden; Marshall at Nunton in Wilts.; Tuck at Norton and Finborough Park, in Suffolk; I have always found it very commonly on pines, spruce and yew from 9th March to 6th April in the Bentley Woods, as well as at Wroxham in Norfolk in June, and on alder at Freston near Ipswich, in August; in January, 1901, Chapman sent me single examples of both sexes of this form, bred together at Maggiore in Italy from a species of *Luffia*—only the single pair emerged. The form *currens* has been taken commonly by Piffard at Felden, as well as by Thornley at South Leverton in Lincoln; Marshall at Nunton in Wilts., and Beaumont at Colwyn Bay in August. Bridgman (Trans. Ent. Soc. 1883, p. 160) refers his male, *annulicornis*, to *P. juvenilis*, and says Marshall took both sexes in numbers in a wood near Milford Haven (*cf.* Ent. Ann. 1874, p. 127), and also by Bignell in plenty at Plym bridge, Bickleigh and Exeter in September. They vary from two millimetres to nearly four in length; in some instances the male has the head nearly as light as the thorax, while in others it is quite dark red (as in the female); the infusate bands on the third and fourth segments also vary in intensity. *P. subtilis* appears to be the apterous form of *P. annulicornis*; Butler sent me an example from Abinger Hammer, near Guildford, in August, 1900; and I have seen another, but without examining it, which was taken by Beaumont at Kilmore, in Ireland, at the end of August.

42. *nigricornis*, Först.

Pezomachus agilis, var. 4a, Gr. I. E. ii. 895. *P. nigricornis*, Först. Wieg. Arch. 1850, p. 140; Voll. Pinac. pl. xii. fig. 5, ♀. (?) *Hemimachus piceus*, Bridg. Trans. Ent. Soc. 1883, p. 153, ♂.

♀. Antennae comparatively short, with the basal flagellar joint decidedly longer than the second. Thorax elongate, especially the mesothorax, which is distinctly separated from the prothorax by a curved line reaching to the metathorax; petiolar area very short, its basal costa sharply defined, forming a low regular curve; apophyses wanting. Abdomen long, closely punctured and pubescent; first segment very narrow at apex; terebra as long as first segment.

Black; joints one to three of flagellum distinctly brown; second and following segments of abdomen with a narrow translucent red posterior margin; sheaths of terebra brown. Legs rufo-testaceous; anterior and intermediate femora with brown shade; last tarsal joint and claws brown. Length, $4\frac{1}{2}$ mm.

?♂. Head opaque, finely reticulate, transverse, slightly sloping behind the eyes; face longer than wide, pubescent; cheeks slightly buccate; clypeus separated, its apex widely rotundate; mandibular teeth sub-equal.

Antennae rather more than three-fourths of the length of the body, pubescent; scape hardly as long as wide; three basal flagellar joints subequal and three times as long as wide. Thorax one-third longer than high, opaque, finely reticulate; mesothorax trilobed, the lines reaching to the middle of the disc; scutellum convex, rather higher than the mesothorax, keels just reaching the base; metathorax long, areae bounded by very fine lines; areola hexagonal, longer than wide, not, or rarely, closed above; lateral areae divided, the postero-medial not defined. Abdomen elongate, cylindrical, not wider than thorax and as long as head and thorax; first segment opaque, finely reticulate, the rest smooth and densely pubescent; first segment of normal length, its apex two or three times as wide as the base, spiracles projecting and placed in the middle, a shallow median furrow and faint keels which do not reach the apex; second rather longer than wide; third sub-quadrant; the rest transverse, the third and fourth widest. Legs slender. Wings with pentagonal areolet, longer than wide, but the outer nervure sometimes obsolete; external inferior angle of discoidal cell opposite the corresponding angle of areolet, or a little beyond; stigma twice as long as wide; radial cell short and deep; transverse discoidal divided nearly one-third from the bottom; nervellus nearly straight, interrupted below the middle, emitting nervure sub-obsolete.

Black; legs red; mouth and under side of scape sometimes piceous-red. Coxae: front, entirely red or with base black; middle, red or marked with black; hind, entirely black or with the apex red. All the trochanters more or less marked with brown. Femora: middle, with a fuscous stain above at the apex; hind, with a more or less distinct fuscous line above. Tibiae: hind, with the apical half more or less fuscous above, less so beneath, and sometimes with a fuscous mark above before the base. Tarsi: middle and hind, sometimes apex of front, fuscous. Wings with base and tegulae pale; stigma fuscous; nervures of front wings fuscous, of hind ones pale. Length, 5 mm.

The ♀ differs from *P. fallax*, Först., in the shorter antennae and terebra, narrow apex of post-petiole, and in the colour of the antennae. From all the black species I have seen the present may be known by its entire and very deeply impressed notauli, and short, vertical and strongly costate petiolar area. In size it resembles *P. instabilis*, from which its close abdominal puncturation and stouter antennae will distinguish it, rather than *P. intermedius*, which has no or obsolete notauli.

I have tentatively ventured to synonymize Bridgman's ♂ with the present species, solely on account of the similarity of colour and pubescence; he himself says (*loc. cit.*) that it is undoubtedly the ♂ of some black *Pezomachus*.

H. piceus was swept at Mousehold Heath, near Norwich, early in August, 1882.

This distinct female is certainly somewhat rare in Britain. Captured at Shaugh bridge in the middle of August (Bignell): a doubtful example found in Guernsey (Luff); occurs in Essex (Vict. Hist.); taken at Hayton, near Calisle, in the middle of April (Routledge). I swept a specimen from rough herbage in the Bentley Woods, near Ipswich, early in November, 1895; and possess another bred from some microlepidopterous host by Dr. Chapman at Locarno, in April, 1900; Piffard has taken it at Felden in Herts.; and I once found it on Southwold Cliffs in late July.

43. *corruptor*, Först.

Pezomachus corruptor, Först. Wieg. Arch. 1850, p. 150; Thoms. O. E. x. 1016, ♀. *P. insidiosus*, Först. Wieg. Arch. 1851, p. 44, ♂. *P. dysalotus*, Först. lib. cit. 1851, p. 61, ♂. Var. *P. faunus*, Först. lib. cit. 1850, p. 165, ♀; *P. conveniens*, Först. lib. cit. 1851, p. 57, ♂; *P. dubitator*, Först. lib. cit. 1850, p. 191, ♀.

♀. Head with the genal sulcus but slightly impressed, its costa inflexed; mandibles more or less basally tuberculate; clypeus sub-rotundate and not raised apically. Antennae short and stout, with the basal flagellar joint slightly longer than the second and the fifth longer than broad. Mesothorax not transverse and shorter than the metathorax; petiolar area basally costate throughout; acetabula occupying the greater part of the mesosternum; petiolar area oblique. Abdomen somewhat shining, finely and somewhat closely pubescent on the three basal segments, more diffusely apically; basal segment gradually and equally explanate throughout, with inconspicuous spiracles, those of the second far from the lateral margins; terebra as long as, or slightly shorter than, the first segment. Legs stout with the anterior tibiae inflated and their coxae prolonged almost to the base of the intermediate.

Head black with the face more or less red centrally. Antennae fulvous, slightly darker apically. Thorax and abdomen testaceous, the former sub-piceous over the anterior coxae, the latter with the anterior incisures and apical segments often more or less piceous, as also is the terebra. Legs fulvous, with the apical tarsal joint darker.

♂. Apterous. Antennae with the two basal flagellar joints sub-equal, the fifth twice longer than broad. Thorax with the petiolar area high and its basal costa usually sharp throughout. Scutellum distinct. Abdomen closely punctate and pubescent on three basal segments, more diffusely apically; spiracles of the first segment variable in size.

Head black with the palpi flavescent and clypeus translucent red. Thorax dull testaceous or darker laterally and around the scutellum. Abdomen either with the two basal segments fulvous, the third darker with or without a piceous discal mark, and the rest piceous or entirely red. Legs immaculate testaceous. Length, $2\frac{1}{2}$ –5 mm.

Thomson suggests that a form of the ♂ is *Hemimachus albipennis*, Ratz., but Marshall identifies this with *Pezomachus avidus*, Först. So much mystery at present surrounds this winged form that it is here omitted; it will, however, be noted that both authors allow the synonymy of Ratzeburg's ♂ with an apterous form of the same sex, and it appears very probable that this confusing dimorphism occurs in other species also.

P. corruptor is similar to *P. acarorum*, Linn., but the terebra is longer, the legs lighter, the mesonotum longer and the anus red-testaceous. This species is certainly identical with *P. faunus*, from which it differs in nothing but the colour of the abdomen, and even here the distinction seems very slight. Förster says *corruptor* has fine lines on the second and third segments, the fourth piceous and the fifth red, while *faunus* has no brown lines, but the third to fifth are infusate. The latter is distinguished from *P. xenoctonus* in the shape of the slope and paler colour; they are probably not distinct. I have no doubt that *P. dubitator* is entirely synonymous with the form *faunus*, since the only discrepancy discoverable in the descriptions is that the fifth flagellar joint is slightly longer in the former.

The sexes of this species were first bred together in Britain from *Tale-*

poria triquetrella (cf. E.M.M. 1889, p. 185); Bridgman, in recording the fact, says, "the ♂ appears to me to be the species Förster described as *P. insidiosus*, and probably *P. dysalotus* is the same." The former has also been bred (Entom. 1883, p. 65) by Fletcher from *Coleophora vininetella*; and Bignell bred what Bridgman says (Trans. Ent. Soc. 1883, p. 161) is the ♂ of *faunus* from *Zygaena filipendulæ*; he found it corresponded exactly with *P. conveniens*, Först. *H. albipennis* is said by Brischke to have been bred from *Psyche viciella*.

P. corruptor is one of our commonest insects, though much more frequent in certain years. Common in Norfolk and bred from *Psyche intermediella* (Bridgman); bred by Giraud from the earthen nests of *Agroeca brunnea*, Blk. (Laboulbène); females at Bickleigh in August and *P. insidiosus* in the same locality early in September (Bignell); Maldon in Essex (Fitch); Battle in Sussex (Vict. Hist.); Bramford in autumn (E.M.M. 1900, p. 42); Dorsetshire (Entom. 1881, p. 137). In Bridgman's collection is an unnamed female labelled "Bred from *Cionus scrophulariæ*, Horsford, August, 1894, H. J. Thouless"; this was bred from the larva of the beetle (cf. Trans. Norf. Soc. 1895, p. 114). Harting and Appledore in Kent, in August and September (Beaumont); Shere in Surrey (Capron); Guestling in Sussex (Bloomfield); Felden in Herts., in July (Piffard); Finborough Park and Bungay in Suffolk (Tuck); Knowle near Birmingham (W. Ellis); Cornworthy and Barnstaple in Devon (Marshall); Lyndhurst in August (Hamm); *P. dysalotus* found at Exeter (Bignell). I have never taken it during hibernation, but it has occurred to me in April, May and June, though commonest in September and October, when sometimes ten or a score may be swept from herbage in woods at dusk or upon dull afternoons. It is not restricted to marshy places, though most frequent there, and I have usually taken it upon the foliage of water plants, though sometimes upon birch, pine and *Mercurialis* at Bentley Woods, Bramford, Brandon, Dodnash and Ipswich in Suffolk, Horning Ferry in Norfolk, Wicken Fen in Cambs., and Gosfield in Essex; the male is of much rarer occurrence, usually in October, and I have received it from the New Forest (Miss Chawner), Felden (Piffard), and Abinger Hammer (Butler). The variety *faunus* has been found by Butler at Guestling and Hollington (cf. Sussex Vict. Hist.) in the Hastings district by J. W. May, and by Bridgman commonly about Norwich (Trans. Ent. Soc. 1881, p. 156; named *P. dubitator*, cf. *lib. cit.* 1883, p. 161 et 1886, p. 341). Bignell is said to have bred this form along with three specimens of *P. conveniens*, which is doubtless its male, from *Zygaena filipendulæ*. Some doubt remains as to whether the *P. dubitator* recorded from the neighbourhood of Norwich (Trans. Ent. Soc. 1882, p. 148) should be also ascribed to this form, which Elliott has recently taken at Scarborough in August.

44. *gracilis*, Först.

Pezomachus bicolor, var. 6, Gr. I. E. ii. 905. *P. gracilis*, Först. Wieg. Arch. 1850, p. 209, ♀. *P. immaturus*, Först. *lib. cit.* p. 225, ♀.¹

Head narrower than abdomen. Antennae with first joint of flagellum distinctly longer than second; fifth very little longer than wide. Meso-

¹ Mr. F. H. Day has taken in the Carlisle district, early in October, 1899, a *Pezomachus* which Elliott thinks is probably referable to the "form" *pulex*, Först. This differs from *immaturus* only in its rather smaller size, in having the head piceous and the apical abdominal segments as dark as the preceding.

and meta-thorax equal ; petiolar area slightly oblique, its basal costa weak, not prominent below. Abdomen diffusely punctured and pubescent, only slightly closer on the three basal segments, first segment with slightly projecting spiracles, evenly explanate from its base to the narrow apex ; terebra as long as first segment.

Head black-brown ; antennae red-yellow, slightly darker from middle. Thorax dull red-yellow. Abdomen with first segment red-yellow ; second brownish with sides lighter ; three to five black-brown ; six to seven pale pitch-brown ; sheaths of terebra brown. Legs red-yellow, femora and last tarsal joint slightly brownish. Length, 1 line.

This species is distinguished from *P. puerilis* by the longer first joint of flagellum, uniformly red-yellow thorax, weaker prominences of the metathoracic ridge and paler apex of tarsi. I have no hesitation in synonymizing it with *P. immaturus*, which is described as differing only slightly in colour, the head being rufescent with flavidous palpi, the antennae not apically infusate and the abdomen fulvous, with segments three to five rather darker.

In introducing the form *immaturus* into our fauna as a good species, Bridgman says (Trans. Ent. Soc. 1886, p. 342), "I have seen a female which agrees exactly with the above insect, taken at Headley." The typical form has occurred at Hastings in Sussex (Vict. Hist.) ; one taken at Tainuilt on 10th September, 1894 (Beaumont).

45. *brevis*, Bridg.

Pezomachus brevis, Bridg. Trans. Ent. Soc. Lond. 1883, p. 162, ♀.

Head transverse, much wider than thorax. Antennae with second joint of flagellum a little longer than first, which is two-and-a-half times as long as broad, fifth rather longer than wide. Thorax very short, much higher than long ; meso- and meta-thorax about equal in length and very short ; petiolar area long, flat and oblique, its basal costa wanting. Abdomen ovate ; spiracles on first segment scarcely projecting ; post-petiole broad ; pubescence scattered ; terebra not quite as long as the first segment.

Black, mouth red ; antennae with joints one to three reddish brown, the rest brown. Abdomen with incisions of the anterior segments slightly pale ; sixth segment is entirely pale. Legs brownish red ; front and middle femora darker towards the base ; hind femora and apex of hind tibiae below, reddish brown. Length, 4 mm.

The remarkable conformation of the thorax, of which the petiolar area is nearly thrice longer than metanotum, is most distinctive.

First taken at Dover by F. P. Pascoe, and subsequently recorded by Bignell from Bickleigh early in August. I possess two females taken by Dr. Capron, probably at Shere in Surrey.

46. *Steveni*, Grav.

Pezomachus Steveni, Grav. I. E. ii. 913 ; Först. Wieg. Arch. 1850, p. 226, ♀.

Head dull ; antennae with first joint of flagellum somewhat longer than second, fifth longer than wide. Meso- and meta-thorax equal in length ; petiolar area oblique, its basal costa entirely wanting above, feeble at sides and only moderately projecting below. Abdomen strongly alutaceous, the

punctures diffuse but very distinct, the pubescence very short : first segment with very prominent spiracles, placed in the middle of segment. Terebra more or less distinctly shorter than first segment.

Head black, palpi dull red, mandibles black with dull red apex. Antennae brown-red, scape black-brown. Thorax blood red, the sternum and the sides above coxae black. Abdomen with first segment red, the rest black, with narrow rufescent posterior margins. Legs dark red ; apex of coxae and base of trochanters black ; femora almost to apex, base and apex of tibiae, and the last tarsal joint brownish ; the hind legs darkest. Length, 5-7 mm.

The gently sloping metathorax and very weak ridge are said to be very characteristic.

Giraud records this species as somewhat doubtfully bred from *Coleophora pyrrhulipennella*, Fallou. It was introduced, probably erroneously, by Desvignes as British, in 1856, and has since figured in our catalogues, though no specific records are obtainable.

47. *instabilis*, Först.

Pezomachus vagans, var. 4, Gr. I. E. ii. 892, ♀. *P. instabilis*, Först. Wieg. Arch. 1850, p. 195 ; Ratz. Ichn. d. Forst. iii. 148 ; Ruthe, Stett. Zeit. 1859, p. 369, ♀ ; Thoms. O. E. x. 1015, ♂ ♀. Var. Bridg. Trans. Ent. Soc. 1883, p. 158, ♂ ♀. *Hemimachus rufocinctus*, Ratz. Ichn. d. Forst. iii. 157, ♂ (*nec* Grav.).

♀. Head with the genal sulcus shallow and narrow, and the costa only normally inflexed ; clypeus elevated and rounded apically ; mandibles tuberculate basally. Antennae slender, with the first flagellar joint longer than the second, and the fifth longer than broad. Metanotum distinctly longer than the mesonotum, which is not transverse ; petiolar area well-defined, punctulate and somewhat dull, with its basal costa distinct ; acetabula hardly reaching beyond centre of the mesosternum. Abdomen sub-glabrous, distinctly alutaceous, with conspicuous punctures and short, erect and very diffuse pubescence ; spiracles of the basal segment not prominent ; terebra as long as first segment. Legs somewhat slender. Wings sometimes indicated by dull red prominences on the mesopleurae.

Head black. Antennae piceous, with the basal three or four joints red. Thorax black, more or less broadly red-marked ; prothorax usually red ; the costae always black. Abdomen black ; usually with the apex of the first segment, often part of second and very rarely the apices of the remainder narrowly, red. Legs red, with the apices of the intermediate tibiae, the hind femora and tibiae, more or less infusate. Length, 2½-5 mm.

♂. Clypeus small and not discreted ; mandibles basally tuberculate. Antennae attenuate towards the apex. Metathorax dull, with the areola distinct and elongate-pentagonal, apically entire ; petiolar area short. Scutellum indicated. Abdomen somewhat dull and finely aciculate with short and diffuse pubescence ; basal segment narrow, with the post-petiole quadrate and spiracles not prominent. Wings with the stigma not broad, emitting the radial nervure beyond its centre ; areolet strongly elongate with the outer nervure wanting ; discoidal cell apically acute and nervellus antefurcal.

Black, with base of antennae entirely or only apex of second joint and base of third pale. Abdomen with apex of the two basal segments, and sometimes also base of the third testaceous. Legs black, with all the trochanters and base of all the tibiae and tarsi, red; posterior femora more or less basally, and the front pair usually entirely, red. Wings hyaline, with the radix infusate and tegulae flavous.

The peculiarly scattered and erect pilosity of the ♀ abdomen is quite unlike that of any other black species of this genus.

There is now, I think, no doubt that *Hemimachus rufocinctus*, Ratz., which is entirely distinct from *Hemiteles rufocinctus*, Grav. (*q. v. ante*), is the true ♂ of *Pezomachus instabilis* (*cf.* Bridg. Trans. Ent. Soc. 1883, p. 158).

A small and common British variety of this species is mentioned by Bridgman: "The male has only a flattened depression indicating the areola, and the female has the legs almost entirely black-brown, and not the greater part red as is generally the case." This is the variety I have referred to under *Hemiteles rufocinctus*, and really it is impossible to tell if he intended it to be placed in that genus or this.

This is apparently a very common species, and has several times been bred from various *Microgaster* cocoons and largely from spiders' nests. Bridgman records "*Pezomachus rufocinctus*, Grav.," as common in Norfolk and bred from *Hyponomeuta padella* and *Laverna epilobiella*. Parasitic on *Microgaster crataegi* and hyperparasitic, through a *Microgaster*, on *Bombyx pini* (Ratz.). Captured at Plym bridge early in August, and both sexes bred on 10th July—apparently directly—from *Zygaena filipendulae* in South Devon (Bignell); a male at Lavingham, in Yorks. (Marshall); Maldon in Essex (Fitch); Harting and Hastings, in Sussex (Vict. Hist.); both sexes hyperparasitic, through *Apanteles zygaenarum*, on *Zygaena filipendulae* (Buckler); both sexes bred from *Coleophora caespitiella* (Entom. 1883, p. 65); Shere in Surrey (Capron); both sexes bred from *Coleophora genistae* and females from *Gracillaria phasianipennella* (Entom. 1881, p. 139); Dorsetshire (P.-Cambridge); Bickleigh, in mid-September (Bignell, Entom. 1882, p. 45); bred by Bignell at Plymouth, on 23rd August, 1882, from a pupa of *Cionus scrophulariae* (Entom. 1885, p. 152). Taken by Evans in Lundin Wood, Dunfermline, early in October, 1897, and by Beaumont at Pevensey and Blackheath, in August.

Bankes bred several females in June, 1903, from the larvae of *Coleophora therinella*, Tgst., collected in the Dartmouth district during the preceding September, together with a single female *Limneria*, upon which they may have been hyperparasitic. Prideaux sent me a number of cocoons of *Apanteles zygaenarum* bred from *Zygaena filipendulae* in July, 1899, and from these cocoons emerged, the following month, eighteen females and one male *Pezomachus instabilis* (*cf.* Trans. Leicester. Phil. Soc. 1899, p. 297). Chapman has sent me specimens from the Continent, bred from Psychids, *Fumea* sp., *Epichnopteryx pulla*, Esp., var. *Sieboldi*, and hyperparasitically from a *Campoplex* cocoon. I possess examples from Blackheath, Lewisham, Oxshott, Harting, Plumstead, Pevensey, Weybridge, Shifnal; Kilmore and Enniscorthy (Beaumont); Carlisle (Tomlin); Dover (Elliott); Felden in Herts. (Piffard); Beer Ferrers (Keys); Shere in Surrey (Capron); New Forest (W. Ellis); and Ilfracombe (E. Saunders); Oakley in Fife (Evans). Unlike most *Pezomachi*, this species undoubtedly spends the winter in the larval condition, and I have only taken it from

late in May to early in October, at Tuddenham Fen, Bentley Woods, Dodnash, Sproughton, Foxhall, Lakenheath, Barnby Broad, Henstead and Dunwich, in Suffolk; as well as at Ryde in the Isle of Wight, Faversham district of Kent, Brockenhurst, Lyndhurst and Matley Bog in the New Forest. It occurs upon low herbage of any kind, from *Sparganium* to *Erica*, though never, like the very similar *P. intermedius*, upon trees and bushes.

48. Försteri, Bridg.

Pezomachus Foersteri, Bridg. Trans. Ent. Soc. Lond. 1886, p. 343, ♀.

Head rather narrow behind the eyes. Antennae reaching to about the apex of the first segment; basal flagellar joint slightly longer than second and two-and-a-half times as long as wide, fifth rather longer than wide. Thorax rather stout, scarcely longer than high; meso- and meta-thorax about equal in length; the transverse costa of the latter terminates laterally in a short and rather acute spine. Abdomen ovate, apex of third segment the widest; pubescence scattered; first segment with the spiracles scarcely projecting, about three times as wide at the apex as at the base, and twice as long as the width at the apex; terebra almost longer than the first segment.

Black, second and base of third joint of antennae red. Legs red; apex of posterior femora, apex and before base of intermediate and posterior tibiae, and apical tarsal joints very faintly brown. Length, $2\frac{3}{4}$ mm.

Similar to *P. instabilis*, but antennae and thorax shorter.

Taken by Dr. Capron near Shere, in 1884; three co-types are in my collection.

49. cursitans, Grav.

Cryptus cursitans, Fab. Piez. 91 (?). *Pezomachus cursitans*, Gr. I. E. ii. 923; Ratz. Ichn. d. Forst. i. 153; iii. 149; Först. Wieg. Arch. 1850, p. 200, ♀; Thoms. O. E. x. 1014, ♂ ♀. *Hemimachus variabilis*, Ratz. Ichn. d. Forst. iii. 158, ♂. *H. rufotinctus*, Bridg. Trans. Ent. Soc. 1883, p. 155, ♂. (?) *Pezomachus elaphrus*, Först. Wieg. Arch. 1851, p. 44, ♂.

♀. Head slightly narrowed behind eyes, cheeks not buccate; sulcus narrow but distinct; costa strongly inflexed; clypeus elevated and rounded at apex; mandibles distinctly tuberculate at apex. Antennae long and slender; joints one to four of flagellum especially elongate; first distinctly longer than second; fifth one-and-a-half times as long as broad. Mesonotum sub-triangular, as long as metanotum; petiolar area oblique, distinct, dull, punctulate and narrow above, its basal costa distinct, especially at sides; acetabula scarcely extending beyond middle of mesosternum. Abdomen sub-glabrous, finely alutaceous, diffusely punctured, with very short pubescence; petiole rather broad at base, spiracles slightly projecting; post-petiole broad but not transverse, its side-margins acute; terebra as long as basal segment. Legs rather long, the anterior ones slender, their tibiae not intumescent.

Head black; palpi blackish or brownish; mandibles red with their extreme apex brown. Antennae with at least the first twelve joints red, then browner towards apex. Thorax black, sometimes with two red spots on mesonotum. Abdomen with segments one and two red; third red, or

black with broad red margins, very rarely entirely black; the rest black and often with very distinct, though narrow, red posterior margins. Legs red; posterior femora and apices of their tibiae fuscous.

♂. Opaque, reticulate; head rather wider than the thorax, buccate, much narrowed behind the eyes; cheeks broad, clypeus discreted. Antennae with first joint of flagellum longest, about four times longer than broad, the remainder gradually decreasing in length, filiform, a little shorter than the insect. Thorax longer than high; mesothorax trilobed, the lines distinctly impressed in front; metathorax of ordinary length, sloping in a curve almost from base to apex, with indications of an elongate pentagonal areola, not closed behind; petiolar area only defined at sides. Abdomen ovate, about as long as head and thorax and a little wider than the latter; first segment linear, slightly longer than three times the width of the base; spiracles very prominent; post-petiole parallel-sided, one-fourth longer than wide, and not quite twice the width of the petiole; second segment sub-quadrate, dull and rugulose; remainder transverse, third and fourth being widest; apical half of the abdomen covered with not very close pubescence. Legs slender. Wings with outer nervure of areolet wanting; recurrent nervure curved towards apex of wing; transverse ordinary interstitial; no nervelet; transverse anal opposite, divided one-third from bottom, emitting nervure distinct; stigma broad, emitting radius beyond its centre.

Black; scape and base of first joint of flagellum partly pale chestnut-red; pronotum and apex of scutellum dull red, apex of first segment of abdomen, second and third pale chestnut-red, second with a transverse fuscous stain in the middle, third with a large brownish-black mark covering nearly the whole segment. Legs pale chestnut-red; front femora behind, intermediate ones in front, with a fuscous line; hind coxae and femora except the base, fuscous; apex of the middle and hind tibiae stained. Wings slightly infumate, with a darker band across the wing before the stigma, and another from the middle of the stigma to the apex of the wing, an irregular white line running along the recurrent discoidal nervure; radial nervure and stigma brown, the latter white at the base. Length, $2\frac{1}{2}$ -5 mm.

I am strongly of opinion that *P. elaphrus* is a dimorphic form of the ♂, but of this I am unable to satisfy myself since I possess but a single old specimen, the only one known in Britain, which was taken by Rev. T. A. Marshall, at Cornworthy in Devon, many years ago. It is an apterous form.

Brischke says that *Hemiteles variabilis*, Ratz., and *H. palpator*, Grav., are both the same species and are the male of *P. cursitans*, Grav.; in the former statement he is probably correct, but I have shown that the latter male must be associated with *P. insolens*. The male may be distinguished from *P. pedicularius* by the darker base of the antennae, darker abdomen and legs.

From *P. decipiens* the female is easily known by the broader head and by the colour of the antennae. According to Förster it differs from *P. peregrinator* in the red spots on the mesonotum and the colour of the abdomen, but the colour alone cannot be relied upon as a distinction between so closely allied species; the chief differences appear to lie in the

metathoracic ridge being less strong in the middle above, the broader base of the petiole and the shorter terebra. It differs from *P. pedicularius* in the mesonotum, which is not transverse, in the longer metanotum and mesosternum, more slender antennae and black mesothorax.

Ratzeburg suggests that this species is parasitic upon *Spilacryptus cimbicis*. He records the female as bred from *Cimbex variabilis*, *Lophyrus pini* and *L. nemorum*, *Tortrix piceana* and *Bombyx pini*. Brischke bred it from *Orgyia gonostigma*, *Microgaster* cocoons and spiders' nests; Kirchner gives *Psyche graminella* as its host; and Dr. Chapman has bred the macropterous male at Lugano from *Acanthopsyche atra*, L., in 1905. This species was mentioned as British by Desvignes in 1856, but I do not know it, and the only record I can find is that of Bridgman's male from Felthorpe near Norwich.

50. *detritus*, Först.

Pezomachus detritus, Först. Wieg. Arch. 1850, p. 196, ♀.

Antennae with first joint of flagellum a little longer than second; fifth rather longer than wide. Meso- and meta-thorax of equal length; petiolar area very slightly oblique, its basal costa very weak above, very sharp at sides. Abdomen excessively diffusely punctured and pubescent, the punctures not visible except under high power; first segment very slightly expanded to the projecting spiracles, thence more strongly, and its apex somewhat broad; terebra as long as first segment.

Head black-brown; antennae red-brown, apex of first and base of second joints of flagellum whitish yellow, the apex darker. Thorax dull dark red, sides brownish. Abdomen black-brown, first segment rather lighter. Legs red-yellow; femora and tibiae except base slightly infusate; last tarsal joint not darker. Length, 2 mm.

Mousehold near Norwich, several females bred from the cocoons of *Apanteles congestus*, which were probably parasitic on *Plusia gamma* (Bridgman).

51. *pedicularius*, Fab.

Ichneumon pedicularius, Fab. E. S. ii. 192 (*nec* Panz.). *Pezomachus pedicularius*, Gr. I. E. ii. 922; Först. Wieg. Arch. 1850, p. 199, ♀; Thoms. O. E. x. 1015, ♂ ♀.

♀. Head narrowed behind the eyes; genal sulcus narrow but distinct, genal costa strongly inflexed; clypeus rounded at apex; mandibles tuberculate at base. Antennae somewhat slender; first joint of flagellum longer than second, fifth slightly longer than wide. Mesonotum transverse, yet longer than metanotum; petiolar area rather oblique, its basal costa forming a high curve, but not very prominent at the sides; acetabula scarcely extending beyond middle of mesosternum. Abdomen sub-glabrous, finely alutaceous and diffusely pubescent; first segment without projecting spiracles, gradually widened from base to apex, second and third rugulose, sub-opaque; terebra as long as first segment. Legs rather stout.

Head black; palpi brown; mandibles red. Antennae red at base, brown at apex; the apex of fourth joint brownish, and this colour increases so that the thirteenth is entirely brown. Pro- and meso-thorax

red, the latter black at the sides ; metathorax black, with two red spots at base. Abdomen with segments one and two entirely, three partly, red, the rest black. Legs red.

♂. Winged. Antennae attenuate towards apex. Wings sub-hyaline, with two indistinct fuscous bands ; stigma broad, radius emitted behind its middle ; nervellus antefurcal ; parallel nervure emitted below middle. Abdomen dilated behind, first segment sub-linear, post-petiole one-and-a-half times as long as wide, second sub-rugulose.

Black ; base of antennae, segments two and three of abdomen, and the legs pale red. Length, 4-6 mm.

Distinguished from *P. cursitans* in the female by the transverse mesonotum, shorter mesosternum, stouter antennae and legs, and by the red mesothorax ; in the male by the colour.

This species has, I believe, been taken by Sladen at Dover. My record of it (E.M.M., 1900, p. 43) is an error and must be referred to *P. vagans*, with which it appears to be much mixed in Britain.

52. comes, Först.

Pezomachus hortensis, var. 3, Gr. I. E. ii. 909, ♀. *P. comes*, Först. Wieg. Arch. 1850, p. 163, ♀ ; Thoms. O. E. x. 1010, ♂ ♀. *P. viduus*, Först. Wieg. Arch. 1850, p. 180, ♀.

Head with the frons alutaceous and dull ; face broad below, with the cheeks smooth, their costa almost continuous and sulcus deeply impressed ; clypeus apically elevated and rounded ; mandibles scarcely tuberculate basally. Antennae with the basal flagellar joint slightly longer than the second and half as long again as the scape, the fifth twice longer than broad. Meso- and meta-thorax of about equal length, the latter smooth and shining ; petiolar area distinct and oblique, with its basal costa sharp and centrally angulated ; acetabula occupying nearly the whole mesosternum. Scutellum not indicated. Abdomen somewhat closely punctate and pubescent to the apex ; basal segment somewhat long and narrow, with no projecting spiracles ; terebra as long as, or slightly shorter than, the basal segment.

Head black ; antennae red and hardly darker towards their apices. Thorax entirely red. Abdomen with the two basal segments entirely, third and fourth more or less, red, the second sometimes discally infuscate ; remainder black with red or flavescent apical margins ; terebra dull red, apically piceous. Legs testaceous with the apical tarsal joint hardly darker.

♂. Winged. Black, with segments two and three red with a small black discal spot. Legs flavous with the coxae black. Wings ample and hyaline ; stigma broad, black with the base white ; radius emitted from beyond its centre ; nervellus antefurcal ; fenestrae small and broadly discreted. Length, $3\frac{1}{2}$ mm.

This species bears a superficial resemblance to *P. corruptor*, var. *faunus*, but the petiolar area is decidedly more oblique and the abdominal punctation close to the anus. From *P. analis* it differs in the broader abdomen, denser pubescence, and shorter terebra. The male is also

similar to that of *P. analis*, though the hyaline wings are longer, the stigma broader, the legs yellow with black coxae, and the central segments differently coloured. It is certainly synonymous with *P. viduus*, which differs only in having the metathoracic costa centrally weaker and the antennae darker.

This is not a very common species with us. Bridgman took three females at Norwich; it is recorded from Essex in the Victoria History; and Elliott has seen an example which was taken by Routledge at Hayton, near Carlisle, early in April, 1900. Tomlin has found it in the Isle of Mull, in August; Chitty, one at Faversham in May; and there is a long series from Surrey in Capron's collection. It has only occurred to me in August and September, by sweeping low herbage at dusk and beating holly in the Bentley Woods, once in company with *P. corruptor*; I have also swept it in the Blean Woods in Kent, and at Hursthill, in the New Forest. It has been recorded as doubtfully bred from *Gyrinus natator* (cf. p. 160, *ante*).

53. *fasciatus*, Fab.

Mutilla melanocephala, Schr. En. 416, n. 841, ♀ (?). *Ichneumon fasciatus*, Fab. E. S. ii. 191; Panz. F.I.G. lxxix. 14. *Pezomachus fasciatus*, Gr. I. E. ii. 889; Zett. I. L. 372; Först. Wieg. Arch. 1850, p. 217; Smith, Trans. Ent. Soc. ser. 2. v. 209; Voll. Pinac. pl. xii. fig. 7, ♀; Thoms. O. E. x. 1013, ♂ ♀. *Hemimachus fasciatus*, Ratz. Ichn. d. Forst. iii. 157; cf. iii. 149, ♂ ♀. *Hemiteles luteiventris*, Gr. I. E. ii. 812; Tasch. Zeits. Ges. Nat. 1865, p. 133; Schm. Term. Füz. 1897, pp. 125 et 543, ♂.

♀. Head with the genal costa inflexed and its sulcus deeply impressed; clypeus apically rounded. Antennae elongate and slender, with the basal flagellar joint longer than the second, and the fifth fully twice longer than broad. Mesonotum longer than broad and as long as the metanotum, often centrally canaliculate; petiolar area punctate and dull, slightly shorter than the notum, its basal costa well defined, especially laterally; acetabula scarcely reaching beyond the centre of the mesosternum. Scutellum tuberculiform. Abdomen sub-glabrous, nitidulous, indistinctly reticulate, diffusely punctate and pubescent; basal segment elongate with the post-petiole longer than broad, with the spiracles more or less distinct; terebra about as long as the basal segment. Legs somewhat slender, the front tibiae scarcely inflated.

Head black, with the palpi piceous. Antennae red, with the scape nigrescent. Thorax and abdomen bright rufo-testaceous, latter with the third segment always strongly fasciated with deep black; rarely the fourth and also fifth with a dark shade. Legs red, the hind ones sometimes partly infusate.

♂. Mandibles basally tuberculate; clypeus not apically dentate. Metathorax elongate and finely punctate with the petiolar area well defined, centrally sub-bicarinata and basally distinctly costate; areola sometimes delineated. Abdomen sub-deplanate, not apically dilated, sub-glabrous and nitidulous; basal segment finely and distinctly punctate, with the petiole narrow, bicarinata and the post-petiole half as long again as broad, spiracles central and prominent; second segment finely rugulose and dull. Wings ample and sub-hyaline; stigma not broad, emitting the radius from about its centre; parallel nervure emitted from centre of

brachial cell ; nervellus opposite, and the areolet pentagonal with its outer nervure wanting

Black ; base of antennae, second, third and apex of first segments red or somewhat infusate. Legs testaceous, with the hind tibiae apically nigrescent. Wings sub-hyaline, with the stigma basally white. Length, 3-5 mm.

Schmiedeknecht says the ♂ legs are black, with the tarsi, tibiae and anterior femora partly testaceous, with the apices of the posterior tibiae black.

Besides that of van Vollenhoven, there is a figure of the ♀ in Wood's "Insects at Home," pl. x. fig. 2.

Smith tells us (Trans. Ent. Soc. 1859, p. 210) that he bred four females from their own oblong cocoons in a single nest of *Agelena brunnea* in the middle of June, 1859 ; subsequently twenty-two specimens were bred from seventy-three nests, in only one case four and in six cases three from a nest, and whenever the parasite emerged no trace of live spiders remained. *Hemiteles formosus* appeared from these nests in about equal numbers, but always singly, and four or five spiders always subsequently developed from the same nest. "It appears to me," he adds, "that the fact of the *Pezomachus* feeding upon the spiders and not on the *Hemiteles* is clearly proved, as, in the latter case, spiders as well as *Pezomachus* ought to have been developed" (cf. Bridgman, under *P. zonatus*, ante), "and when we take into consideration the fact of *Pezomachus* being quite as bulky an insect as *Hemiteles*, it can scarcely be supposed that the larva or pupa of the latter could afford nourishment to three or four larvae of the former." Both sexes of the *Hemiteles* emerged, precluding an idea of sexual affinity, unless under greatly dimorphic conditions, which the gregarious and solitary habits of the species appear to finally preclude.

This is one of our most abundant species, though, like *P. instabilis*, it occurs almost exclusively on low herbage. Common in Norfolk ; frequently bred from *Apanteles* cocoons (Bridgman), and from nests of *Agroeca brunnea* (Giraud and Bridg.) ; Bickleigh and Exminster ; and twice bred in Devon in the middle of July from the egg-bags of spiders, *Lycosa pullata* (Bignell) ; common at Glanvilles Wootton (Dale, who also records it from Harris in the Hebrides) ; occurs at Fairlight, Dallington and Peppering, in Sussex (Vict. Hist.) ; Shere in Surrey (Capron). Both sexes in Dorsetshire ; male bred from the egg-sac of a species of *Theridion* (Pickard-Cambridge, Entom. 1881, p. 137) and examined by me. Both sexes parasitic on *Microgasteridae* (Entom. 1881, p. 139)—these are represented in Bridgman's collection, labelled "Bred from *Microgaster* nest, Norwich, Sep., 1880." Bramford, near Ipswich (E.M.M. 1900, p. 42) ; taken in the Carlisle district (Day) ; Deal marshes in July (Sladen) ; on the sea-shore, near Weymouth (Richardson) ; Lake District (Bowdler) ; Hendon in January, and Barnby Broad (Elliott) ; Scotland (Dalglish) ; Thornton in Fife (Evans) ; Isle of Mull (Tomlin) ; Retford (Thornley) ; Felden (Piffard) ; Appledore, Whitby, Church Stretton, Kilmore and Enniscorthy (Beaumont) ; New Forest (Miss Chawner) ; Shere in Surrey (Capron) ; Knowle and Boxhill (W. Ellis) ; Southwold and Norton Wood, in Suffolk (Tuck). It has occurred to me during every month of the

year, being rarest in the late spring; in grass tufts and by sweeping; at Wherstead, Ipswich and Tuddenham Fen, in Suffolk; as well as at Brockenhurst and near Halstead in Essex. The only mention of it from a lepidopterous host is that of Ratzeburg, who says he bred it from a species of *Psyche*. Brischke bred it from *Gymnetron campanulae* in Prussia; and in 1894 I bred two females from *Coccinella septempunctata* at Ipswich.

54. *palpator*, Grav.

Hemiteles palpator, Gr. I. E. ii. 818, excl. ♀ et varr. 1, 2, 3, 5; Tasch. Zeits. Ges. Nat. 1865, p. 134; Schm. Term. Füz. 1897, p. 543, ♂. *Hemimachus palpator*, Ratz. Ichn. d. Forst. iii. 154, ♂. *Pezomachus bicolor*, var. 3, Gr. I. E. ii. 903, ♀. *P. insolens*, Först. Wieg. Arch. 1850, p. 230, ♀.

♀. Head obsoletely punctate, though not nitidulous; clypeus apically margined and rounded; epistoma somewhat convex. Antennae filiform and somewhat slender; basal flagellar joint much longer than the second and nearly four times longer than broad; fifth twice longer than broad. Thorax glabrous, with obsolete notauli; metanotum slightly longer and more convex than the mesonotum; petiolar area not strongly oblique, somewhat long, its basal costa centrally obsolete; apophyses wanting. Scutellum entirely wanting, its suture deeply impressed. Abdomen shining and sub-ovate, diffusely and obsoletely punctate and pubescent; basal segment sub-pyriform, sometimes with very strongly projecting spiracles, at others laterally straight to the moderately broad apex; terebra longer than the basal segment.

Head black, with the mandibles rufescent. Antennae piceous, with the four or five basal joints red. Thorax red, with the sternum and extreme apex usually piceous. Abdomen with the two or three basal segments entirely red; the third usually black, with its basal half, or only the basal angles, red; rest black, rarely with their apical margins narrowly rufescent. Legs red, last tarsal joint piceous; sometimes with apices of the hind femora, tibiae and tarsi infusate.

♂. Head black, hardly contracted behind the eyes, finely coriaceous and dull; occiput slightly convex; eyes not small; mandibles stout, not basally tuberculate, sub-glabrous, acutely and distinctly bidentate at apex; cheeks deeply sulcate, not short, a little buccate and longer than the base of the mandibles; clypeus somewhat shining, centrally distinctly convex, discreted from the face, apically elevated and sub-marginate, its anterior margin rounded, not truncate and with no central tooth. Antennae slender, black, apically sub-attenuate: flagellar joints cylindrical, the first rufescent beneath and basally whitish above, the second not excised; scape not globose nor cylindrical, not apically entire, ferrugineous beneath. Thorax black; mesonotum slightly nitidulous, finely punctate; acetabula reaching to or a little beyond centre of the mesosternum; metathorax finely scabriculous, dull, not produced beyond the base of the hind coxae, the longitudinal and transverse costae distinct: areola complete, elongate and not discreted from the basal area; apophyses wanting; petiolar area well defined, oblique, not short, with its basal costa distinct throughout; spiracles minute, circular, deeply inserted and facing backwards. Scutellum somewhat distinctly convex, dull black, sub-scabriculous, with its lateral carina not extending beyond the basal angles. Abdomen

not glabrous, distinctly dull and densely alutaceous, and very sparsely pubescent; black, with the apical margins of the three basal segments, the thyridii and basal angles of third segment, pale red; first segment not broad, parallel-sided, only slightly broader and distinctly margined beyond the somewhat prominent spiracles, which are situated a little behind the centre, its discal carinae obsolete; second segment with distinct glabrous thyridii, which are narrower than the intervening space; valvulae large, piceous, far exerted and apically broadly rotundate. Legs slender, clear red, not flavous-marked; calcaria of normal length; first joint of front tarsi strongly excised at the base, its calcaria red; intermediate coxae and apical tarsal joints somewhat infusate, their calcaria for the most part clear white; hind coxae entirely, femora and tarsal joints except at their extreme bases, and tibiae towards apices, piceous; hind tibiae slightly intumescent a little before their base; hind femora sub-canaliculate internally. Wings ample; hyaline; tegulae black, radix and base of stigma clear white; remainder of the broad stigma and the nervures piceous, former emitting the radius a little before its centre; radius sub-trapezoidal and apically straight; lower angle of discoidal cell hardly acute, its external fenestra interrupted by a corneous line; external nervure of the areolet pellucid and sub-obsolete; nervellus antefurcal; cubitus of hind wing strongly inflexed in its basal half. Length, 5-6 mm.

I am quite satisfied that the above ♂ is the typical insect of Gravenhorst's *H. palpator*, and trust my detailed description will set at rest the uncertainty which has hitherto existed regarding its true position and opposite sex; it is very positively the ♂ assigned to *P. trux* by Marshall, though I do not find that the mandibles are basally tuberculate, and the colour of the abdomen varies in extent. The ♀ is said to differ from *P. geochares* in the longer spiracles and entirely red femora.

I am unable to ascertain what authority Marshall had for associating the typical ♂ of Gravenhorst's *Hemiteles palpator*¹ with *P. trux*, but—since Bridgman says (Trans. Ent. Soc. 1886, p. 341) that he sent Professor Thomson “the species which Mr. Marshall named for Mr. J. E. Fletcher as *Hemimachus trux*; this he returned to me named *P. insolens*, thus confirming my opinion. *P. trux* must, I think, be removed from our list”—it is evident that the latter was incorrectly included in our fauna, and it appears extremely probable that the ♀ was, *de facto*, the present species.

I have described both sexes above, from seventeen ♀ ♀ and four ♂ ♂ bred together by Mr. A. H. Hamm from *Zygaena lonicerae* at Shotover, near Oxford, in July, 1900, which are now in my collection.

H. palpator has been bred from *Coleophora melilotella* and *Eupaecilia atricapitana* (Entom. 1881, p. 139). *P. insolens* is mentioned from Lynn in Norfolk, and bred from *Coleophora fuscadinella*, *C. vibicella* and *Talaeophora pseudobombycella* (Bridgman, in whose collection at Norwich are both sexes of this species on one card); captured at Bickleigh, early in

¹ As illustrative of the hopelessness of arriving hitherto at a correct definition of Gravenhorst's ♂, and also of the present . . . (unprintable word omitted!) condition of our National Collection of British Ichneumonidae, it may be well to point out that the ten specimens standing under *Hemiteles palpator*, in the Natural History Museum, are (1) a ♂ *Atractodes* sp.; (2) *Exolytus flavipes*, Thoms., ♂; (3) *Atractodes exilis*, Hal., ♂; (4, 5) *Hemiteles inimicus*, Gr., ♀ ♀; (6) a ♀ *Phygadeuon*; (7) *Panargyrops tenuipes*, Gr., ♀; (8) *Phygadeuon vagans*, Gr., ♀; (9) *Phygadeuon rufulus*, Gmel., ♀.

August (Bignell); Surrey (Capron); Land's End district (Marquand); Weybridge and Box Hill (Beaumont); Maldon in Essex (Fitch); a female bred by Barrett from *Saturnia carpinii* (Buckler); Dorsetshire (Entom. 1881, p. 137); Chobham (Butler). Piffard has given me a female from Felten in Herts., and Bloomfield another (recorded as *P. bellicosus* in the Nat. Hist. Hastings) from Guestling in Sussex.

55. *geochares*, Först.

Pezomachus geochares, Först. Wieg. Arch. 1850, p. 231, ♀.

Antennae with the basal flagellar joint longer than the second, the fifth very nearly twice longer than broad. Meta- longer than the meso-thorax; petiolar area elongate and oblique, its basal costa forming a short ridge in the centre and thence obsolete to the strong and obtuse apophyses. Scutellum wanting. Abdomen very diffusely punctate and pubescent, somewhat nitidulous; basal segment not broad, petiole very slightly explanate, post-petiole more strongly and divergently; spiracles not projecting; terebra fully as long as the basal segment.

Head black, with the palpi and mandibles piceous. Antennae piceous, with the three basal joints clear red and the following rufescent. Thorax red with the sternum and pleurae below, extending centrally nearly to the scutellar region, black. Abdomen deep black with the three basal segments, except the apical margin of the third, clear red. Legs fulvous; apices of the hind femora, with the intermediate and hind tibiae, black. Length, $3\frac{1}{4}$ mm.

This species is distinguished from *P. acarorum*, which it very closely resembles in colour, by the scanty and very diffuse pubescence and the shorter fifth flagellar joint; in structure it is much more nearly related to *P. palpator*, the less prominent petiolar spiracles and piceous femoral apices being very variable characters, and I should have thought it probably synonymous, in spite of the more elongate and narrower abdomen, much shorter and less attenuate basal flagellar joints, were it not that the latter is not at all variable in size and is so much larger.

Ratzeburg (Ichn. d. Först. iii. 147) says the colour of the thorax varies greatly, the disc and petiolar area being sometimes black-marked with the second segment less pure red and the third entirely dark. It is possible he confused it with *P. vagans*.

In introducing this species as British (Trans. Ent. Soc. 1882, p. 148), Bridgman says, "Taken at Deal, on the 18th April, 1881, a *Pezomachus*, which I believe to be this species; it differs only from Förster's description in having the third abdominal segment black, and red only at the sides." Beaumont took two at Harting in Sussex, early in September, 1899. I have taken three specimens by sweeping dead reeds, on the banks of the Gipping, at Ipswich, 2nd October, 1895, and 10th March, 1896. On the Continent it is recorded as bred from *Psyche lichenella* by van Vollenhoven, through *Perilitus flavipes* from *Tortrix piceana* by Ratzeburg, and from *Pumea nitidella* by Kirchner.

56. see page 229

57. *hyponomeutae*, Bridg.*Hemimachus hyponomeutae*, Bridg. Trans. Ent. Soc. Lond. 1883, p. 155, ♂.

Finely reticulate, opaque; head transverse, slanting behind the eyes. Antennae as long as the insect; first joint of flagellum four times as long as wide; following joints gradually tapering to about the middle, thence sub-equal to the apex. Mesothorax trilobed, the lines reaching to the middle of the disc; metathorax without superior areae, its transverse costa strongly projecting without interruption. Abdomen about as wide as the thorax; first segment gradually tapering, nearly twice as wide at the apex as at the base; spiracles very prominent; post-petiole about one-and-a-half times as long as wide; remaining segments transverse, apex of third being the widest. Legs slender. Wings with pentagonal areolet; outer nervure wanting; transverse anal nervure divided below the middle.

Black; scape and first joint of flagellum red, the former stained with brown; apical third of first segment, base and apex of second, red; the black band in the middle of second segment rather more than one-third the width of the segment. Legs red; apical half of hind femora slightly stained with brown, as is also the apex of hind femora and apex of the tarsal joints. Base of wings pale; nervures and stigma fuscous, the latter white at the base. Length, 6 mm.

This insect is at first sight like *P. zonatus*, but the head is narrower behind the eyes; the first abdominal segment, although of the same shape, is stouter, and the spiracles much more prominent; the metathorax has no areae and the coxae are red.

Bred from *Hyponomeuta evonymellus* by Mr. Mosley, probably at Huddersfield.

58. *indagator*, Först.

Pezomachus indagator, Först. Wieg. Arch. 1851, p. 47; Voll. Pinac. pl. xxxvii. fig. 9, ♂. (?) *P. tachypus*, Först. *lib. cit.* 1851, p. 53, ♂.

Head black with the palpi dull flavescent and the mandibles red with their apices black. Antennae with the four basal joints pure rufo-testaceous and the remainder dull ferrugineous; basal flagellar joint slightly longer than the second; fifth twice longer than broad. Thorax black; pro- partly and apex of the meso-thorax more or less fulvous; petiolar area not large, its basal carina not very prominent and centrally depressed. Scutellum wanting. Abdomen very diffusely punctate, black, with the apex of the basal segment, base and apex of the second, fulvous; basal segment with no tubercles, equally explanate throughout or with the post-petiole slightly more explanate. Legs rufo-testaceous with the hind femora almost entirely, their tibiae at base and apex slightly, infusate. Length, 3 mm.

I am of the opinion that *P. tachypus*, which Chapman has sent me from Cannes, where he bred it from *Fumea nitidella*, is only a much better developed form of this species, having the scutellum distinct and the abdominal puncturation and pubescence fine and close.

This species has long stood in the British list upon very shallow authority, and I am in but a poor position to uphold its right to inclusion therein, since I possess only a single, somewhat doubtful example, captured several years ago by Rev. T. A. Marshall at Nunton in Wiltshire.

THAUMATOTYPUS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 172.

Head sub-globose, eyes small, cheeks elongate with no sulcus. Flagellum stout; scape sub-cylindrical and apically hardly excised; basal flagellar joint one-third longer than the second. Thorax very finely rugose; metathorax with the petiolar area reaching beyond its centre and the apophyses distinct. Scutellum distinct. Abdomen with the second and third segments connate, not discreted and occupying most of the abdominal surface; petiole elongate, post-petiole sub-constricted beyond the prominent tubercles; terebra hardly exerted and less than half length of the basal segment. Wings wanting.

Bridgman tells us the antennae are as in *Pezomachus*; Thomson says that, as well as the legs, they are stout, but it appears advisable to retain this somewhat anomalous genus in the *Pezomachoides*, since the conformation of the metathorax, which is described by Ashmead as "abruptly, obliquely truncate behind, the truncature superiorly bounded by a sharp carina," appears allied in its elongate petiolar area with the *Stilpnides*.

I am, however, strongly of opinion that the single species is referable to the *Proctotrypidae*. Mr. A. J. Chitty thinks it correctly here placed.

1. *Billupsi*, Bridg.

Thaumatotypus Billupsi, Bridg. Trans. Ent. Soc. 1882, p. 145, ♀. *Pezomachus Billupsi*, Thoms. O. E. x. 1018, ♀.

Head smooth with the genal costa hardly inflexed and clypeus discreted. Antennae seventeen-jointed; flagellum stout and sub-filiform with joints two to twelve sub-equal in length, the basal joint fully thrice longer than broad and the fifth only slightly so. Meso- and meta-thorax sub-equal in length and slightly transverse; petiolar area excavate and basally rounded, acetabulae occupying the entire mesosternum. Abdomen oblong-oval, smooth and shining; basal segment elongate and sub-linear, attenuate towards its apex, with tubercles just behind the centre; post-petiole aciculate; basal angles of second segment rounded. Legs elongate and slender with the calcaria short. Wings wanting.

Piceous, with the abdomen paler and first flagellar joint basally flavescent; legs testaceous. Length, 2 mm.

Bridgman says it was taken at Burford bridge in September, 1881, and that Dr. Capron had also taken an example of the same genus, probably at Shere in Surrey; there are two specimens in his collection, which I possess. It is recorded elsewhere only by Thomson from Ringsjön, in Skandinavia; he describes the basal segment as sub-rugosely punctate and the legs as stouter than may be inferred from the English description.

I have seen a specimen taken at Charing in Kent (probably in moss), by Chitty, on the 20th May, 1905.

TRIBE.

STILPNIDES.

This Group is of but small extent and the sexes differ considerably in facies. The females are easily distinguished from the remainder of the *Cryptinae* by their either orbicular and extremely deplanate, or very strongly convex and apically compressed abdomen, and not or very shortly exerted ovipositor. The males for the most part resemble those of *Phygadeuon* and *Hemiteles*; the abdomen is, however, more strongly nitidulous and the areolet is smaller, rarely externally entire, emitting the external cubital nervure from the centre, that is to say, higher than is usual in those genera. Both sexes are, nevertheless, abundantly distinct in having the metathorax declived from base to apex with no trace of a central transverse costa, but always bearing a longitudinal dorsal channel composed of the confluent central and petiolar areae; the coxae are said to be usually inserted a little before the apex of the metathorax, but I fail to follow this distinction very clearly.

Considerable doubt has been expressed regarding the position of these genera. Gravenhorst placed *Atractodes* among the *Ophioninae* on account of the compressed female abdomen, and *Exolytus* in the *Tryphoninae*, considering *Stilpnus* to belong to the *Ichneumoninae*, because its terebra was not distinctly exerted. Taschenberg included *Stilpnus* and *Exolytus*, but not *Atractodes*, in the *Cryptinae*, where the first alone was treated of by Marshall, who left the latter two, as placed by Holmgren, in the *Ophioninae*. These three genera were exhaustively monographed by Förster, in 1876, who, amid great chaos, at least showed conclusively their close relationship. He was followed by Thomson, who admirably treated of them in his great Opusc. Ent., but failed to discover valid distinctions between *Exolytus* and *Atractodes*; and none of the Continental authors have given adequate attention to Haliday's succinct descriptions of sixteen species of the latter genus "indicated in Mr. Curtis's Guide." One of his species appears so incongruous in any of the above genera, that I have thought it advisable to erect a new one for its reception.

Table of Genera.

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| (2). | 1. | Apophyses usually stout; areolet entire; ♀ abdomen ovate..... | STILPNUS, Grav. |
| (1). | 2. | Apophyses wanting; areolet not entire; abdomen elongate, of ♀ compressed. | |
| (6). | 3. | Labial palpi with apical joint normal; petiolar spiracles behind centre. | |
| (5). | 4. | Head transverse; metathorax rarely produced; basal segment curved..... | ATRACODES, Grav. |
| (4). | 5. | Head cubical; metathorax produced; basal segment straight | EXOLYTUS, Holmgr. |
| (3). | 6. | Labial palpi with apical joint elongate; petiolar spiracles central | MESATRACODES, Morl. |

STILPNUS, *Gravenhorst*.

Gr. I. E. i. 664 (1829).

Small, smooth and strongly shining insects, with the abdomen more or less flat and ovate. Head short and transverse, with oval and prominent eyes; clypeus not distinctly discreted, quite flat, apically slightly rounded, with basal lateral foveae. Antennae normal, slightly attenuate basally, consisting of nineteen (in ♀ fourteen to seventeen) joints, of which the third is about twice longer than broad and conical, the following soon becoming as broad as long and cylindrical. Metathorax short and not produced beyond the base of the hind coxae, all the areae sub-entire but with the areola wanting and the dentiparal transverse, apically truncate; longitudinal costae of the petiolar area usually strong; spiracles circular and very small, approaching the lateral costae. Scutellum convex and apically obtuse. Abdomen petiolate, usually deplanate, smooth and strongly nitidulous, of ♀ sub-orbulate and broader than the thorax, of ♂ fusiform; basal segment narrow, sub-linear or with the post-petiole slightly explanate, carinate and aciculate, with spiracles behind the centre; remainder of abdomen strongly deplanate and nitidulous; second segment with lateral impressed lines and distinct epipleurae, of ♀ strongly, of ♂ slightly transverse. Legs slender. Wings ample, areolet pentagonal and apically sub-complete; stigma broad, emitting the radial nervure from its centre.

Haliday and Gravenhorst noted the affinity of this genus with *Hemiteles*, than which the abdomen is distinctly shorter and more circular; Curtis first drew attention to its similarity to *Atractodes*; the abdomen is not centrally plicate ventrally after desiccation.

This ill-defined genus was placed originally, like *Pristicerus* and *Ischnus*, as a sub-genus of *Ichneumon* or, as we should nowadays say, among the *Ichneumoninae*, whence Taschenberg, who knew but one species, transferred it to the *Cryptinae*, in spite of its hardly exerted ovipositor. At that time it would have been more correctly placed among the *Ophioninae*, but now that Thomson, following Förster's impossible classification to a reasonable extent, has indicated its close affinity with *Atractodes*, and has, perhaps more correctly, placed the whole group in the *Cryptinae*, it were better to treat of it here, though, wherever it be placed, it must remain to some degree aberrant. Fitch says that the fact of a species having been bred from a cocoon of its own manufacture shows that the genus does not belong to the *Ichneumoninae*, and the same may be said with almost equal propriety of the *Cryptinae*, in spite of the more or less distinctly pentagonal areolet.

Table of Species.

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| (6). | 1. Head not abruptly contracted behind the eyes. | |
| (3). | 2. Abdomen strongly convex, black; flagellum of ♀ stout, not reaching petiole | 1. GAGATES, <i>Grav.</i> |
| (2). | 3. Abdomen deplanate, centrally red; flagellum normal, reaching petiole. | |
| (5). | 4. Second segment entirely rufescent | 2. PAVONIAE, <i>Scop.</i> |
| (4). | 5. Second segment laterally or apically black | 3. DRYADUM, <i>Curt.</i> |
| (1). | 6. Head abruptly contracted behind the eyes. | |
| (8). | 7. Abdomen centrally red | 4. BLANDUS, <i>Grav.</i> |
| (7). | 8. Abdomen entirely black | 5. DEPLANATUS, <i>Grav.</i> |

1. *gagates*, Grav.

Stilpnus gagates, Gr. I. E. i. 667; Curt. B. E. 388; Ste. Ill. M. vii. 209; Tasch. Zeits. Ges. Nat. 1865, p. 56; Först. Verh. Wien. z.-b. Ver. 1876, pp. 36, 41; Thoms. O. E. x. 1027, ♂ ♀.

Head not narrowed behind the eyes, black with the palpi pale; clypeus slightly discreted, somewhat impressed laterally, apically rounded and obsoletely punctate; mandibles with the upper tooth a little the longer. Antennae short, filiform and somewhat stout; of ♀ half the length of the body, of ♂ longer; more or less broadly red basally, with the scape usually nigrescent above. Thorax black and nitidulous, with acute apophyses. Abdomen glittering black and as long as the thorax, of ♂ lanceolate, of ♀ sub-orbiculate, deplanate and broader than the thorax, with the basal segment sub-linear; post-petiole a little broader and canaliculate, with ♂ spiracles usually prominent; terebra sub-exserted. Legs normal, fulvous, with the coxae and trochanters sometimes partly black. Wings hyaline; stigma piceous, radix and tegulae pale testaceous; areolet pentagonal and entire, with the external cubital nervure obsolete; lower angle of the discoidal cell not or hardly acute, nervellus antefurcal. Length, 4-5 mm.

From all the following this species differs in its centrally sub-produced clypeus and basally testaceous antennae. The female is very distinct in its short, incrassate antennae, which do not reach to the apex of the metathorax.

It is said to occur in gardens and upon house windows; Hope took it at Netley in Shropshire and Haliday in Ireland, in June and August. St. John's Wood at the end of September (Curtis); not uncommon in June, near London (Stephens); Brundall near Norwich, in July (Bridgman); Bickleigh, early in August (Bignell); Land's End (Marquand); Lastingham in Yorks. (Marshall); Fairlight in Sussex (Hastings List); common at Glanville's Wootton (Dale); Maldon in Essex (Fitch). Dr. Capron used to take it commonly at Shere in Surrey, and I have found it at Blakenham and Monks' Soham in Suffolk, on the flowers of *Angelica sylvestris* in the middle of August. Brischke has bred it in Germany from the very abundant British dipteran, *Anthomyia radicum*, Linn.

2. *pavoniae*, Scop.

Ichneumon pavoniae, Scop. Ent. Car. 762; Christ Hym. 368; Oliv. Enc. méth. 214, ♀. *Stilpnus pavoniae*, Gr. I. E. i. 672; Ste. Ill. M. vii. 209; Curt. B. E. 388; Först. Verh. Wien. z.-b. Ver. 1876, p. 36; Brisch. Schr. Ges. Danz. 1881, p. 345; Thoms. O. E. x. 1028, ♂ ♀.

Head hardly narrowed behind the eyes; clypeus apically rounded and not produced. Antennae longer than half the body, with the basal joints pale red; the following black in ♂, testaceous and gradually becoming darker apically in ♀. Thorax black; petiolar area not or only slightly impressed, but distinctly discreted; apophyses distinct and obtuse. Abdomen black with the second segment entirely, and often the third of ♀, testaceous or rufescent; of ♂ lanceolate-oblong with the five basal segments gradually dilated, of ♀ sub-orbiculate and slightly broader than

the thorax ; post-petiole gradually dilated apically, nearly twice longer than broad and as long as the linear petiole ; terebra not exerted. Legs slender, luteous, with the hind coxae sometimes basally infusate ; ♂ with the hind tarsi and apices of their tibiae infusate. Wings of ♂ hyaline, of ♀ slightly clouded ; stigma piceous, radix and tegulae pale testaceous ; areolet pentagonal with the external cubital nervure somewhat indistinct ; lower angle of the discoidal cell not or hardly acute ; nervellus a little antefurcal. Length, 3-4 mm.

The whole insect, as well as its legs and antennae, is more slender than *S. gagates* ; the longer legs and far less posteriorly abruptly narrowed head will at once distinguish it from *S. deplanatus*.

Curtis, who thought this species perhaps no more than a variety of *S. gagates*, records it as not uncommon in Ireland from June to August, and also from St. John's Wood. Stephens says it is less abundant than *S. gagates*, but is found at Darenth Wood in June and July. It has also occurred at Eaton in July ; Cann Quarry in Devon, late in September ; Maldon in Essex and Shere in Surrey. I have found the female upon a house window at Witlesham and Monks' Soham in Suffolk, early in September ; and flying about an evergreen shrub in an Ipswich garden as late in the year as October 25th, which date points, I think, to hibernation.

3. *dryadum*, Curt.

Stilpnus dryadum, Curt. B. E. fol. et pl. ccclxxxviii. ; Ste. Ill. M. vii. 210 ; S. v. Voll. Schets. I. pl. i. fig. 4, ♂ ♀.

A black and shining species. Head of ♂ strongly buccate posteriorly, with frons sparsely punctate and centrally longitudinally canaliculate. Antennae basally stramineous, with the scape sometimes black above ; of ♀ with but fourteen joints. Abdomen of ♂ with a pale ochreous band at the anterior margin of the second and third segments ; of ♀ rarely entirely black, usually with a broad ochreous stripe down the back of segments two to four, a spot at the apex of the first, and the margin of the second, pale ochreous ; post-petiole centrally canaliculate. Legs ochreous, with the apices of the tarsi nigrescent. Wings basally flavescent, with the stigma and nervures testaceous. Length, 4-6 mm.

No subsequent author has supplemented the above meagre description given by Curtis, who, however, adds much in his figure of what is lacking in words. I follow Bridg.-Fitch in ascribing van Vollenhoven's figure to this species ; he represents the ♀ abdomen as ovate, and that of the ♂ as apically sub-truncate. The ♀ coloration recalls certain *Panargyrops*.

This species, which is still unnoticed upon the Continent, has not been recorded from Britain since Haliday took the type specimens of both sexes on oak trees in Galway. In Dr. Capron's collection I have four ♂ ♂ which are, there can be but little doubt, referable to this species ; they were probably captured in Surrey. Further, I have myself taken the same species at Barton Mills, in Suffolk, in June, and possess a specimen from Marshall, from Nunton in Wiltshire.

4. *blandus*, Grav.

Stilpnus blandus, Gr. I. E. i. 672; Curt. B. E. 388; Ste. Ill. M. vii. 210; Först. Verh. Wien. z.-b. Ver. 1876, p. 33, ♀; Brisch. Schr. Nat. Ges. Danz. 1881, p. 345; Thoms. O. F. x. 1028, ♂ ♀.

Head not buccate behind the eyes, black with the centre of the mandibles and the palpi red or dull ferrugineous. Antennae somewhat stout, infusate with the scape red or testaceous beneath, and the three following joints ferrugineous; second flagellar joint fully twice longer than broad and longer than the third; of ♀ stout and apically incrassate, with the scape entirely black. Thorax immaculate, with the petiolar area impressed and finely rugose transversely. Abdomen black, with segments two and three, except the apex of the latter, rosy red; basal segment with no tubercles, gradually explanate apically; terebra very shortly exerted. Legs red; hind ones with the tarsi, and coxae externally towards the base, nigrescent. Wings hyaline; stigma infusate, radix stramineous, tegulae testaceous; lower angle of the discoidal cell acute and further from the base than the small areolet. Length, 4 mm.

This species is similar in size and conformation to *S. deplanatus*; Brischke says the wings are like those of *S. gagates*, and Thomson adds that the structure of the head and the antefurcal nervellus are analogous, but that the metathorax is smoother and more nitidulous, the abdomen longer with the post-petiole not bicarinate, and segments two and three, with the apex of the first, red.

It is probably not uncommon in woods in September. Curtis says it is rare, but was taken by Haliday in Ireland, and Stephens found it at Hertford. Bridgman took it occasionally at Norwich in June and August, and Bignell records it from Bickleigh in Devon, early in the latter month. There are eight females in Capron's collection, and I took another at Brandon in Suffolk on 24th August, 1905.

5. *deplanatus*, Grav.

Stilpnus deplanatus, Gr. I. E. i. 667; Ste. Ill. M. vii. 209; Först. Verh. Wien. z.-b. Ver. 1876, p. 34, ♀.

Head black, somewhat abruptly rounded behind the eyes; frons sparsely but not finely punctate, with a few long hairs; vertex not emarginate, face distinctly pilose; mouth partly red. Antennae rather longer than the head and thorax, very slightly incrassate apically; basal flagellar joint alone red and as long as the scape and pedicellus. Abdomen ovate-orbiculate, as broad as the thorax, strongly deplanate, sub-glabrous, nitidulous, and obsoletely alutaceous; basal segment gradually very slightly dilated apically, irregularly striolate throughout, with no distinct carinae; post-petiole somewhat strongly curved and laterally margined, with small tubercles; the extreme apical angles of the second segment pale; terebra shortly exerted. Legs not very short; red, with the coxae and trochanters black, and onychii infusate. Wings flavescent-hyaline; stigma piceous, tegulae black, radix pale stramineous. Length, 4 mm.

Gravenhorst says this species is similar in size and conformation to *S. gagates*, but that the terebra is more distinctly exerted; the antennae,

however, are much longer and more slender, the abdomen deplanate and the head posteriorly contracted.

Rare near London, in June (Stephens); Fairlight in Sussex (Hastings List). Mr. E. A. Butler bred one specimen, which I have examined, of this species, in 1881, "from a silky white cylindrical cocoon, with an opaque white girdle round its centre, which was three lines long. The host was a lepidopterous larva, feeding on honeysuckle, collected in Brecknockshire" (Entom. 1881, p. 139 *et* 1882, p. 223). It is probably by far our commonest species in Britain. Capron found it abundantly at Shere in Surrey; Piffard and I have taken it at Felden in Herts., in September; and Tuck has sent it to me from Finborough Park in Suffolk.

ATRACTODES, *Gravenhorst*.

Gr. I. E. iii. 789 (1829).

Head transverse, usually buccate, but not cubical; eyes oval, entire, somewhat small and occasionally pilose; central joints of the labial palpi normal, the apical not unusually elongate. Antennae of ♀ filiform, somewhat short, about half the length of the body and sometimes stout, with the apical joint oblong-ovate; of ♂ setaceous and a little shorter than the body. Thorax very rarely distinctly punctate; metathorax rarely produced and nearly always gradually declived throughout, with a parallel-sided, longitudinal, sub-impressed central area, consisting of the always coalesced areola and petiolar area. Scutellum triangular and gibbulous. Abdomen petiolate, sub-glabrous and strongly nitidulous; of ♀ more or less distinctly compressed laterally, often narrower than the thorax, of ♂ always deplanate; oblong-ovate or linear-lanceolate; basal segment sub-linear, usually margined, slightly explanate apically and not reaching beyond the hind trochanters, with spiracles beyond its centre; second segment very rarely transverse, usually longer than broad and gradually contracted basally, with a fine lateral impressed line reaching to the spiracles; terebra hardly exerted and nearly hidden by the hypopygium. Legs somewhat slender, hind ones sub-incrassate; calcaria often curved and the onyches usually elongate; front tibiae anteriorly pubescent but not spinulose. Wings normal; radial nervure emitted from beyond the centre of the stigma; areolet pentagonal, with the outer nervure often obsolete.

Gravenhorst mentions the affinity of this genus with the *Ichneumoninae*, and Haliday thought it hardly distinct from *Stilpnus*.

It is very difficult in the majority of cases to synonymize the thirteen short descriptions of Haliday's species, hardly any of which have hitherto been recognized on the Continent; only those which were supplemented by Holmgren have been adopted by Förster, among whose multitudinous concourse they, in all probability, figure under unknown synonyms. I have taken a central course, however, and allowed such of them as appear to merit specific rank to stand in our fauna, at least for the time being. Three have, I think, been described subsequently by Continental authors, two others sink as preoccupied, and there can be little doubt that *A. proferator* is referable to a distinct genus which ought, perhaps, to be placed in the *Tryphoninae*.

Table of Species.

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|-------|-----|---|-------------------------------|
| (22). | 1. | Metathorax not apically produced ; radius emitted beyond centre of stigma (<i>TRACTODES</i> , <i>auctt.</i>). | |
| (21). | 2. | Antennae at least apically infusate. | |
| (4). | 3. | Notauli deeply impressed ; petiole short ; body aeneous | 1. VESTALIS, <i>Hal.</i> |
| (3). | 4. | Notauli inconspicuous ; petiole slender ; body nitidulous. | |
| (20). | 5. | Wings not shorter than body ; coxae at least partly black. | |
| (13). | 6. | Calcaria not longer than onychium ; onyches long and slender. | |
| (12). | 7. | Basal segment laterally straight ; eyes pilose ; areolet entire. | |
| (11). | 8. | Head and thorax sub-glabrous ; anus infusate. | |
| (10). | 9. | Anus punctate-pilose ; legs red | 2. BICOLOR, <i>Grav.</i> |
| (9). | 10. | Anus sub-glabrous ; legs flavidous..... | 3. GILVIPES, <i>Holmgr.</i> |
| (8). | 11. | Head and thorax punctate ; anus castaneous | 4. CITATOR, <i>Hal.</i> |
| (7). | 12. | Basal segment laterally curved ; eyes glabrous ; areolet incomplete | 5. GRAVIDUS, <i>Grav.</i> |
| (6). | 13. | Calcaria distinctly longer than onychium ; onyches stout. | |
| (15). | 14. | Pronotum and mesopleurae punctate | 6. COMPRESSUS, <i>Thoms.</i> |
| (14). | 15. | Pronotum and mesopleurae glabrous. | |
| (17). | 16. | Apophyses distinct ; ♀ flagellum pale-banded | 7. SUBRUFUS, <i>Grav.</i> |
| (16). | 17. | Apophyses obsolete ; ♀ flagellum not banded. | |
| (19). | 18. | Central metathoracic area dilated | 8. PICEICORNIS, <i>Hal.</i> |
| (18). | 19. | Central metathoracic area parallel-sided | 9. EXILIS, <i>Hal.</i> |
| (5). | 20. | Wings shorter than body ; coxae entirely rufescent | 10. SALIUS, <i>Hal.</i> |
| (2). | 21. | Antennae entirely testaceous | 11. CROCEICORNIS, <i>Hal.</i> |
| (1). | 22. | Metathorax apically produced ; radius emitted near centre of stigma (<i>ASYNCRITA</i> , <i>Först.</i>) | 12. FOVEOLATUS, <i>Grav.</i> |

i. vestalis, Hal.

Hemiteles tenebricosus, Gr. I. E. ii. 785 ; *Tasch. Zeits. Ges. Nat.* 1865, p. 121, ♂ (?). *Atractodes vestalis*, Hal. *Ann. Nat. Hist.* 1839, p. 118 ; *Curt. B. E.* 538 ; *Holmgr. Sv. Ak. Handl.* 1858, n. 8, p. 112 ; *Först. Verh. Wien. z.-b. Ver.* 1876, pp. 130, 159, ♂ ♀. *Polyrhembia tenebricosus*, *Först. lib. cit.* pp. 43, 47, ♂ ♀. *Atractodes tenebricosus*, *Thoms. O. E.* x. 1026, ♂ ♀.

A small black, sparsely punctulate and strongly nitidulous species, with almost an aeneous reflection. Head smooth, buccate and not narrowed behind the eyes, the space between which and the mandibles is broad ; clypeus sparsely punctulate and apically rounded ; mandibles centrally broadly red with sub-equal teeth. Antennae black, slightly longer than head and thorax, filiform ; ♀ with the basal flagellar joint as long again as the second. Thorax immaculate with distinct and deeply impressed notauli ; metathorax finely scabriculous, with the parallel-sided central area sub-impressed and smoother. Abdomen ovate, immarginate and in ♀ apically sub-compressed ; basal segment stout, apically curved and

somewhat shorter than the hind coxae and trochanters, with the post-petiole deplanate and spiracles slightly prominent; second segment hardly longer than broad, the third shorter; terebra very shortly exerted. Legs black with the tibiae and sometimes the knees, testaceous or piceous, the anterior centrally and the hind ones apically infusate; tarsal claws acuminate, elongate and very slender; tibiae shortly and closely setulose, calcaria slender and strongly curved; femora somewhat stout. Wings hyaline, areolet sub-triangular, more or less entire; lower angle of the discoidal cell acute; stigma piceous and radix testaceous. Length, 3-7 mm.

This species is at once known from the remainder of the genus by its oval and immarginate abdomen, conspicuous notauli, aeneous lustre and very slender onyches. Haliday says it "might perhaps with equal reason be referred to the genus *Stilpnus*; indeed any definite line drawn between these two genera must be arbitrary."

[I am by no means prepared to accept Gravenhorst's name for this species, since *H. tenebricosus* is described as having the head transverse with pale cheeks, the petiolar area discreted, the basal segment irregularly and the second feebly aciculate, with the areolet pentagonal. To me it appears more nearly allied to *Hemiteles tristator*, Grav. *A. vestalis* is probably the uninstanced type of Förster's genus *Polyrhembia*, which appears to differ from *Atractodes*—as restricted in his Monograph—in having the ocelli nearer each other than to the eyes, the second segment not at all or entirely bordered, the apical tarsal joint rather longer, and the radial nervure emitted from the centre of the areolet, which is always entire. Ashmead's distinctions are trivial.]

Haliday says this is a common species in Ireland. It has been recorded from Norfolk commonly, Hooe and Bickleigh in Devon, and Land's End; I have seen specimens from St. Margaret's Bay, Lynton, Gullane near Edinburgh and Blackburn. Capron found it commonly at Shere; Marshall at Nunton; Beaumont at Shifnal; Piffard at Felden; and Yerbury at Golspie, Hereford and Tarrington. It has occurred to me abundantly on flowers from May to September at Wortham, Mildenhall, Lowestoft, Barham, Ipswich, Marlesford, Brandon, Foxhall and Belstead (all in Suffolk); but I can find no record of its parasitism.

2. bicolor, Grav.

Atractodes bicolor, Gr. I. E. iii. 791; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 113, ♀; Hal. Ann. Nat. Hist. 1839, p. 119; Först. Verh. Wien. z.-b. Ver. 1876, pp. 119, 129; Thoms. O. E. x. 1022, ♂ ♀. Var. *A. fumatus*, Hal. Ann. Nat. Hist. 1839, p. 119, ♂ ♀.

Shining, hardly punctate, black. Head transverse, with the palpi, apex of clypeus and more or less of the mandibles red or testaceous; eyes pilose. Antennae filiform and about half the length of the body, infusate, with the scape beneath and the following joints ferrugineous in ♀, stramineous in ♂. Thorax rarely with a testaceous dot before the radix; central metathoracic area broad but not deeply excavate. Scutellum triangular and sub-gibbulous. Abdomen as broad as or a little narrower than the thorax, very smooth and nitidulous, fusiform or lanceolate-linear, of ♀ laterally and ventrally compressed, with the anus truncate; basal segment straight, sub-linear and slightly dilated apically with the post-petiole hardly longer than broad and half the length of the petiole; the

second and third segments, except sometimes the apex of the latter, castaneous; the former not transverse; terebra sub-exserted. Legs somewhat slender, fulvescent, with the hind coxae more or less broadly black basally, and the anterior sometimes flavescent; tarsi apically infusate, with the onychium almost longer than the calcaria, their claws long, somewhat slender and reaching far beyond the pulvilli; tibiae shortly and closely setulose. Wings normal, sub-hyaline; stigma piceous, tegulae dull red, radix pale stramineous; areolet pentagonal and entire. Length, 4-8 mm.

The extent of the coloration in the clypeus, antennae, legs and abdomen appears to be extremely variable. Gravenhorst mentions ♀ varieties with the central segments entirely pale red and almost entirely black. Haliday others with the hind femora and base of the intermediate coxae infusate, and a ♀ with entirely black abdomen and antennae; his *A. fumatus* has all the coxae, trochanters and the apices of the hind tibiae black, with at most the base of the third segment red—he adds that it is an uncommon form. Holmgren says the hind coxae, femora and apices of their tibiae are sometimes infusate-piceous, and Brischke that the clypeus is often immaculate.

I have, after arriving at the supposition that *A. fumatus* was no more than a small variety of *A. bicolor*, examined several specimens of what Bridgman understood as the former, and I find they differ in no respect from the present species, excepting in their rather smaller size and darker coloration.

This species differs from *A. gravidus* in its much more slender form, straight basal segment, paler anterior coxae, smaller and complete areolet. It may at once be recognized by its having hairy eyes, the lack of impressed lines upon the ♀ second segment, the closed areolet and the sparsely punctate-pilose posterior ventral segments.

It is said to occur on house windows, in August and September; Haliday calls it a common species. From Norwich Bridgman records it in May and July; Bignell captured it at Bickleigh, and Evans at Gullane near Edinburgh, in June, July and August; Harwood mentions its occurrence in Essex. I possess specimens from Shere (Capron); flood refuse from Pett in Sussex (Newbery); Golspie (Yerbury); Greenings (W. Saunders); Whiting Bay in the Isle of Arran (Waterston); and I have found it in Suffolk in decaying carcasses of moles and rabbits, as well as at Lyndhurst in a dead cow's head (*cf.* Ichn. Brit. i. 291), where it is probably parasitic upon *dipterous larvae* or hyperparasitic upon such things as *Alysia manducator*, Panz., though it has never yet been bred.

3. *gilvipes*, Holmgr.

Atractodes gilvipes, Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 112; Först. Verh. Wien. z.-b. Ver. 1876, p. 130; Thoms. O. F. x. 1022, ♀.

Shining, punctulate, black. Head with the palpi infusate, mandibles testaceous and apically darker. Antennae and thorax immaculate. Abdomen black, with the basal segment straight and the second not transverse. Legs fulvescent, with the hind coxae, base of trochanters and sometimes a line on all the femora nigrescent, tibiae and tarsi often infusate; tarsal claws elongate and very slender, reaching far beyond the

pulvilli; tibiae shortly and closely setulose; calcaria strongly curved and almost shorter than the onychium. Wings distinctly clouded; stigma infusate, radix and tegulae stramineous, latter sometimes dark; areolet entire. Length, 4-6 mm.

This species is very similar to *A. vestalis*, excepting the structure of the basal segment and the coloration of the legs; the tarsal claws are less elongate than those of *A. bicolor*.

Lakenham, Norfolk, in May (Bridgman); Bickleigh, in the middle of September (Bignell); common at Shere (Capron); Chobham, in July (Beaumont); Greenings in Surrey (W. Saunders); Tostock in Suffolk (Tuck). It is probably quite a common species. I have taken it at Lyndhurst, and in a dead rabbit at Brandon in Suffolk, in June. Dr. T. R. Cassal has given me a female bred early in May, 1900, at Ashby near Doncaster, in a cage containing larvae of *Acidalia marginepunctata*, Göze.

4. citator, Hal.

Atractodes citator, Hal. Ann. Nat. Hist. 1839, p. 120.

This species, as far as one is enabled to judge from the very short description, is closely allied to *A. bicolor* in the coloration of the abdomen and legs, but it is very different in its distinctly punctate head and thorax, and in having only the base of the abdomen black. All the tibiae, excepting the apices of the hind pair, and the anterior femora are testaceous. Length, 7 mm.

It was originally recorded from Ireland by Haliday, and no one has ventured to subsequently identify it but Bignell, who somewhat boldly records it from Bickleigh in Devon, on 3rd August, upon Bridgman's authority. I have examined the latter specimen, which is a female, and find hardly any distinction between it and those of *A. exilis*; the onyches are stout and calcaria longer than the onychium.

5. gravidus, Grav.

Atractodes gravidus, Gr. I. E. iii. 793; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 112; Först. Verh. Wien. z.-b. Ver. 1876, p. 127, ♀; Hal. Ann. Nat. Hist. 1839, p. 118; Thoms. O. E. x. 1023, ♂ ♀.

Shining, somewhat sparsely punctate, black. Head buccate and not at all narrowed behind the eyes; cheeks strongly tumidous, the space between the eyes and the mandibles broad; palpi and centre of mandibles testaceous. Antennae stout, rather shorter than half the body, filiform with the joints sub-moniliform; infusate with the scape usually rufescent beneath. Thorax a little narrower than the head; notauli anteriorly distinct; metathorax short, nearly twice higher than long; central area broad and only slightly impressed, apophyses not strong. Scutellum elevated. Abdomen of ♀ fusiform, apically sub-compressed and as broad as the thorax; black with the sub-quadrate second and third segments, together with the gradually dilated apex of the first, entirely red, the following conical and gradually contracted towards the apex; basal segment distinctly curved and nearly as long as the hind coxae and trochanters; terebra not exerted.

Legs normal; red with coxae, trochanters and the hind tibiae before their base, black; tibiae shortly and closely setulose; tarsal claws elongate, acuminate and very slender, reaching far beyond the pulvilli; onychium almost longer than calcaria. Wings with the stigma infusate, tegulae black and the radix pale stramineous; areolet pentagonal with the outer nervure sub-obsolete. Length, 3-10 mm.

Holmgren mentions a ♀ variety with the second and third segments entirely black.

This species is less slender than *A. bicolor*, with the abdomen stouter and hardly compressed apically, the antennae shorter and thicker, and the central metathoracic area less deeply impressed; the areolet is much larger than that of *A. vestalis*. It may easily be differentiated by the short impressed lateral lines of the second segment, which hardly extend to the spiracles, by its glabrous eyes, externally slender tarsal claws, incomplete areolet, confluent fenestrae, antefurcal nervellus, and the ♂ by the hardly elevated lines of the central flagellar joints.

It is found upon *Umbelliferae* in August. Rare in Ireland, according to Haliday; found at Forres by Chitty in 1892; taken by Bignell at Bickleigh, towards the end of August; by Bloomfield about Hastings; by Sladen at St. Margaret's in Kent, in August; and at Blackburn, on the window of St. Anne's station in July, by Bowdler. Tuck has sent me a male from Finborough Park in Suffolk, at the end of September, 1900; and I captured another on *Angelica* flowers in the Reydon marshes at Southwold during the following week. It is probably attached to low-lying, swampy land.

6. *compressus*, Thoms.

Atractodes arator, Hal. Ann. Nat. Hist. 1839, p. 119, ♂ ♀ (?). *A. compressus*, Thoms. O. E. x. 1023, ♂ ♀.

A black species with the head not narrowed behind the eyes. Antennae of ♀ basally testaceous, apically sub-incrassate, with the last joint oblong, and the penultimate half as long again as broad. Thorax with the pronotum and mesopleurae punctate; central metathoracic area not dilated. Abdomen centrally testaceous; of ♂ usually with the whole of the third segment, and narrow lateral with broad apical margins of the second, red; the latter bearing impressed lateral lines extending to the spiracles. Legs testaceous, with the hind ones partly black; tarsal claws stout, calcaria elongate. Areolet externally not entire. Length, 5-7 mm.

This species is among the largest of the genus, and may be known by the punctate pronotum and mesopleurae.

Haliday's *A. arator* agrees very well with Thomson's species in the shape of the apical flagellar joint, coloration of the abdomen and of the legs, but his description is too inadequate to synonymize them with any certainty, unless the types be examined, and these (which are preserved in the Dublin Museum) are, I am informed, not labelled. The former was found uncommonly at Holywood.

Bridgman first noticed *A. compressus* in Britain, at Wroxham in Norfolk, in June, and Martineau has given me a female which he took at Selsley, in May, 1893.

7. *subrufus*, Grav.

Tryphon subrufus, Gr. I. E. ii. 280, ♂. *Atractodes albovinctus*, Hal. Ann. Nat. Hist. 1839, p. 119; Curt. B. E. 538; Thoms. O. E. x. 1024, ♂ ♀.¹

A black species with red palpi. Antennae of ♀ broadly white-banded, basally testaceous and apically sub-incrassate, with the apical joint oblong, and the penultimate half as long again as broad. Apophyses obtuse and distinct. Abdomen centrally red, of ♀ fusiform and apically compressed; the second segment with impressed lateral lines extending to the spiracles. Legs red with, the hind coxae black and their tarsi infusate, becoming apically paler; tarsal claws stout, calcaria elongate. Areolet not externally entire. Length, 4–6 mm.

The obtuse apophyses and ♀ flavidous flagellar band will easily distinguish this species. It is obviously closely allied to *A. spiniger*, Voll. Tjd. v. Ent. 1878, p. 170, which is a ♂ with tricoloured antennae.

The synonymy here adopted is that entered in MS. in Marshall's private copy of his 1872 Catalogue, and it certainly appears to be correct.

Not common in Ireland (Haliday). Bignell's record of this species from Devon is an error.

8. *piceicornis*, Hal.

Atractodes piceicornis, Hal. Ann. Nat. Hist. 1839, p. 119, ♀. *A. flavicoxa*, Thoms. O. E. x. 1024, ♂ ♀.

A black species with the head narrowed behind the sparsely pilose eyes, and testaceous mandibles. Antennae of ♀ somewhat stout apically, with the last joint oblong and the penultimate half as long again as broad. Metathorax with the central area nitidulous and dilated in its centre. Abdomen fusiform, centrally broadly testaceous and apically compressed; the second segment with lateral impressed lines reaching the spiracles. Legs stout and roughly pubescent, testaceous with the hind coxae infusate; tarsal claws stout and calcaria elongate. Areolet not externally entire. Length, 3–7 mm.

This little-known species differs from *A. axilis* in its posteriorly contracted head, pubescent legs and centrally explanate petiolar area.

I have retained Haliday's name for this species, because the much better defined *A. flavicoxa* has not been yet mentioned from Britain, and his description is too short to definitely determine the synonymy.

Eyrecoot in September (Haliday); Land's End district (Marquand); I took one female in Suffolk in 1894, and a second on *Angelica* flowers at Foxhall in the middle of September, 1903.

¹ *A. varicornis*, Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 114, ascribed to this species by Marshall, is now regarded as synonymous with *Callidiotes (Mesoleptus) coxator*, Grav.—cf. Först. Verh. Wien. z.-b. Ver. 1876, p. 191 et Thoms. O. E. ix. 910.

9. *exilis*, Hal.

Atractodes exilis, Hal. Ann. Nat. Hist. 1839, p. 119; Curt. B. E. 538; Först. Verh. Wien. z.-b. Ver. 1876, p. 125, ♀; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 113; Thoms. O. E. x. 1024, ♂ ♀.

Shining, punctulate, black. Head buccate, shining and not narrowed behind the eyes; mouth ferrugineous. Antennae basally ferrugineous, rarely entirely infusate; of ♀ sub-incrassate apically, with the last joint oblong and the penultimate half as long again as broad. Metathorax finely rugose with the central area a little impressed and more nitidulous, with the upper lateral areae strongly incomplete. Abdomen strongly compressed in ♀, black, with the second and third segments mainly or entirely ferrugineous (Hal.), rufo-testaceous (Holmgr.), or flavo-stramineous (Thoms.), the former with impressed lateral lines extending to the spiracles, of ♂ usually black, with the apical margin red; basal segment smooth and linear, nearly straight, slightly dilated apically and a little shorter than the hind coxae and trochanters. Legs testaceous or ferrugineous, usually with the hind, often also the anterior, coxae basally, the femora and apices of the tibiae, infusate; onyches stout and not elongate, calcaria long. Wings slightly clouded; stigma infusate, radix and tegulae testaceous; areolet pentagonal, with the outer nervure obsolete. Length, 4-7 mm.

This species is probably often confused with *A. bicolor*, but the structure of the legs is very different, and it may be at once known from *A. compressus* by its smooth and shining pronotum and mesopleurae.

Haliday says it is very rare in Ireland, and that it was found in England by Francis Walker. At Norwich it has occurred in May and July; at Bickleigh in Devon, in September; Shere, Whitby, Lewisham, Harting, Felden, Pembridge, Tarrington, Barmouth, and Greenings in Surrey. It is a common species at Bramford, Foxhall, Rushford, Brandon and Bungay in Suffolk, Horning Ferry in Norfolk; and in August, 1901, I found it swarming on *Heracleum* flowers, in an ordinary meadow, at Lyndhurst in the New Forest.

10. *salius*, Hal.

Atractodes salius, Hal. Ann. Nat. Hist. 1839, p. 119, ♀.

A black species, with the mouth and base of the antennae ferrugineous. Abdomen compressed and centrally ferrugineous, with the basal segment gradually explanate and canaliculate apically. Legs ferrugineous, with the hind femora infusate. Wings distinctly clouded and shorter than the body, with the areolet incomplete. Length, 6-8 mm.

The short wings and dark-marked hind femora would appear to ally this inadequately described species with *A. parallelus*, Thoms., which, however, is much smaller, with the markings testaceous.

Eyrecourt, in September (Haliday).

11. *croceicornis*, Hal.

Atractodes croceicornis, Hal. Ann. Nat. Hist. 1839, p. 119, ♀. *A. ruficornis*, Brisch. Schr. Nat. Ges. Danz. 1881, p. 178, ♀.

Head nitidulous, not narrowed behind the eyes, with the palpi and mandibles ferrugineous. Antennae entirely testaceous. Metathorax with five upper areae, of which the central is hardly impressed. Abdomen compressed and centrally ferrugineous; basal segment slender and straight, with the post-petiole gradually explanate apically; second segment longer than broad. Legs testaceous, with the hind coxae basally and sometimes their femora infusate. Wings narrow and hardly clouded, with the tegulae testaceous. Length, 4-7 mm.

Ireland, rare (Haliday). I took a specimen, which I believe to be referable to this species, by general sweeping in a marshy spot at Barton Mills in Suffolk, on 11th June, 1900.

12. *foveolatus*, Grav.

Atractodes foveolatus, Gr. I. E. iii. 794. *A. foveolator*, Thoms. O. E. x. 1025, ♂ ♀. *A. cultellator*, Hal. Ann. Nat. Hist. 1839, p. 120; Curt. B. E. 538, ♀; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 114, ♂ ♀. *Asyncrita foveolata*, Först. Verh. Wien. z.-b. Ver. 1876, p. 39, ♀.

Shining, punctulate, black. Head with mandibles centrally broadly red and the eyes glabrous. Antennae filiform, half the length of the body, with the flagellum basally red beneath. Metathorax caudately produced behind the hind coxae; central area broad, strongly excavate and nitidulous; upper lateral areae very incomplete. Abdomen longer than head and thorax, of ♀ strongly compressed and lanceolate; immaculate or with the second and third segments partly badius; basal segment flat and quite straight with the petiole slender, linear and a little longer than the post-petiole, which is gradually dilated apically, more than twice broader than the petiole and in ♀ laterally immarginate; second segment with no lateral impressed lines. Legs very variable in colour, usually red with the anterior coxae, trochanters and base of the intermediate femora, black; hind legs black with the tibiae red and tarsi infusate; calcaria short and curved. Wings slightly clouded with the areolet entire; radix and tegulae testaceous or stramineous, the latter often infusate. Length, 3-8 mm.

The legs are sometimes mainly infusate or piceous, at others nearly entirely testaceous. Haliday says the legs of *A. cultellator* are red, with only the posterior coxae black, and that its abdomen is hardly shorter than the hind legs and centrally piceous-red.

This species may be distinguished by its much longer and more strongly compressed abdomen (recalling that of *Chaenon anceps*, Curt.), much more slender petiole, smaller head and slightly shorter tibiae.

Holywood (Haliday). It is probably uncommon in Britain, since the only example I have seen is a female given me by Mr. W. H. Tuck, who captured it at Aldeburgh in Suffolk, in September, 1899.

EXOLYTUS, *Holmgren*.

Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 115; Öfv. 1858, p. 328.

An elongate and strongly nitidulous genus. Head strongly buccate, often cubical, posteriorly emarginate and usually broader than the eyes; clypeus distinctly discreted and apically broadly rounded; epistoma prominent; central joints of the labial palpi normal, the apical not unusually elongate. Antennae sub-filiform, rather longer than half the body; of ♀ with the joints conical, the third twice longer than broad and the following becoming gradually shorter; of ♂ setiform with the joints cylindrical. Thorax strongly nitidulous with mesonotum very convex; metathorax also convex and apically distinctly produced above the base of the hind coxae; areae incomplete, the central area conspicuous and transversely wrinkled; spiracles circular, apophyses wanting. Scutellum convex, apically contracted and abruptly declived. Abdomen deplanate in both sexes, pygidium of ♀ somewhat compressed and acuminate, of ♂ obtuse, less nitidulous and more strongly pubescent; basal segment broader than high, straight and rarely deflexed apically, reaching beyond the hind coxae and trochanters, with the spiracles distinctly beyond the centre; post-petiole sub-quadrate and shortly canaliculate centrally; segments two and three not compressed, with lateral impressed lines; terebra very shortly exerted. Legs normal, claws simple; front tibiae anteriorly pubescent but not spinulose. Areolet pentagonal, with the external nervure obsolete; nervellus usually antefurcal.

This genus was, I believe, first mentioned by Förster in the Verh. pr. Rhein. in 1855, but I have not seen his description, which is probably very bald, with no type, and only Kirchner refers it to him.

Very little is at present known of the economy of this genus, though both Brischke's record of *E. laevigatus* from *Tenthredinidae* and Thomson's of *E. incertus*, Först., from Syrphid larvae point to its relation with the *Tryphoninae*.

Table of Species.

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|------|----|--|------------------------------|
| (4). | 1. | Lower wing with median nervure entire basally; antennae immaculate. | |
| (3). | 2. | Head cubical; frons distinctly punctate;
♀ flagellum apically attenuate | 1. LAEVIGATUS, <i>Grav.</i> |
| (2). | 3. | Head posteriorly rounded; frons finely punctate; flagellum filiform | 2. PETIOLARIS, <i>Thoms.</i> |
| (1). | 4. | Lower wing with median nervure obsolete basally; antennae basally red. | |
| (6). | 5. | Vertex broad; flagellum normal, of ♀ basally attenuate; coxae red | 3. SCRUTATOR, <i>Hal.</i> |
| (5). | 6. | Vertex narrow; flagellum slender and filiform; coxae black | 4. SPLENDENS, <i>Grav.</i> |

1. *laevigatus*, *Grav.*

Ichneumon laevigatus, Gr. Mem. Ac. Sc. Torin. 1820, p. 371. *Mesoleptus laevigatus*, Gr. I. E. ii. 111, cf. i. Suppl. 687; Ste. Ill. M. vii. 230, ♂ ♀. *Exolytus laevigatus*, Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 115, excl. var. 1; Tasch. Zeits. Ges. Nat. 1865, p. 10; Först. Verh. Wien. z.-b. Ver. 1876, p. 49, etc.; Brisch. Schr. Nat. Ges. Danz. 1881, p. 179, ♂ ♀. *Atractodes laevigatus*, Thoms. O. E. x. 1019. *A. Dionaens*, Hal. Ann. Nat. Hist. 1839, p. 118; Curt. B. E. 538, ♂ ♀. *Phygadeuon mesozonius*, Gr. I. E. ii. 700, ♂. *P. teneriventris*, Gr. lib. cit. 698, et i. Suppl. 707; Ste. Ill. M. vii. 300; Tasch. Zeits. Ges. Nat. 1865, p. 55, ♂.

Nitidulous, sparsely punctate, black. Head cubical, shining and sub-dilated behind the eyes; face sub-pilose, cheeks and temples tumidulous, clypeus apically broadly rounded, frons distinctly punctate; palpi pale, rarely infusate; mandibles more or less broadly rufescent centrally. Antennae black; of ♀ with the flagellum stout and sub-attenuate apically. Thorax stout; metathorax shining with the areae somewhat indistinct; central area broad and somewhat impressed, dentiparal elongate-triangular. Abdomen nitidulous; basal segment nearly straight and slightly deflexed at its apex, sub-linear or a little dilated apically, of ♀ laterally immarginate; second and third segments mainly or entirely red, with the spiracles large and placed far from the sides, which are posteriorly immarginate, the former longer than broad and gradually contracted basally, of ♂ sometimes only apically red, the latter quadrate. Legs red, with coxae and trochanters at least partly black; intermediate femora sometimes basally, hind ones often entirely or partly black; hind tibiae sometimes and their tarsi apically infusate. Length, 5-8 mm.

The size of this species and the extent of the rufescent coloration of the legs and abdomen are very variable.

[I think there can be no doubt that the following description of *P. teneriventris*, drawn from Gravenhorst and Taschenberg and supplemented by Brischke, is identical with that of *E. laevigatus*, though it appears strange that no one has before made use of the supplementary note:—

♂. Head with the palpi, generally a mandibular mark, and rarely the discreted and apically rounded clypeus, pale red. Antennae filiform and usually with the two basal joints red beneath. Metathorax elongate, declived throughout, with the lateral areae complete; areola parallel-sided, basally rounded and apically confluent with the transversely rugose petiolar area; apophyses wanting, spiracles circular. Scutellum black. Abdomen linear, black, usually with the second segment apically and laterally, the third except its apex, and rarely the base of the fourth, testaceous-red; basal segment linear, aciculate, with prominent spiracles; second nitidulous and obsoletely punctate. Legs, including all the trochanters, red; hind coxae basally, and rarely most of the anterior, black; hind tarsi infusate. Wings slightly clouded, areolet sub-pentagonal, of variable size; radix and tegulae stramineous, the latter sometimes infusate. Length, 5-7 mm.

Gravenhorst's var. 1 has the second segment as well as the third pale red, all the coxae and trochanters basally black, with the areolet triangular and vertically coalesced. Var. 2, all the femora partly black, the hind tibiae externally infusate with the areolet small and sub-triangular. His var. *mesozonius* is more slender, and differs in having the abdomen and its basal segment somewhat shorter, and its size hardly five millimetres; all its coxae and trochanters black; the third segment alone, except its margin, red; and the areolet irregularly pentagonal and sub-pyramidal, with the external nervure obsolete. This last, perhaps, more closely resembles one of the true *Atractodes*.

He says it occurs in August on *Umbelliferae* and September on *Angelica sylvestris*: Stephens professes to have identified it from the London district in June.]

E. laevigatus may be distinguished by its apically spinulose hind tibiae, infusate coxae, basally entire median nervure of the hind wings, basally

sub-immaculate antennae, posteriorly immarginate central segments, with their large and high spiracles, the broad and nitidulous central area and somewhat indistinct lateral areae, with the shape of the dentiparal.

This is an exceedingly abundant insect everywhere, from June to September, on bushes, *Angelica* flowers, wild carrot and *Foeniculum vulgare*; and I have records from Guernsey and the Land's End to Arran, the Isle of Man and Kilmore.¹ It would appear to have been very rarely bred, though Brischke gives various species of *Lophyrus* and *Tenthredo* larvae as its hosts in Prussia.

2. petiolaris, Thoms.

Atractodes petiolaris, Thoms. O. E. x. 1020, ♂ ♀.

Head rounded behind the eyes, sub-cubical. Abdomen centrally red, with the basal segment quite straight. All the femora and tibiae red. Length, 4-6 mm.

This species is so closely allied to the preceding as to need no detailed description. The posteriorly rounded head with narrower vertex, filiform flagellum, quite straight post-petiole, more sparsely punctate frons and cheeks, and rather smaller size, are quite sufficient to easily distinguish it.

It has not been hitherto noticed in Britain, though probably common with us; I have found it upon the flowers of *Angelica sylvestris* at Foxhall in early September, and the late Mr. Alfred Beaumont gave me specimens taken in August, at Whitby.

3. scrutator, Hal.

Atractodes scrutator, Hal. Ann. Nat. Hist. 1839, p. 118, ♂ ♀. *A. flavipes*, Thoms. O. E. x. 1021, ♂ ♀. *Exolytus laevigatus*, var. 1, Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 115.

Head black with the vertex broad and the mandibles red. Flagellum not very slender, basally attenuate and rufescent, apically filiform. Metathoracic areae distinct. Abdomen centrally rufescent; basal segment margined throughout. Legs entirely pale red, with at most the ♂ hind tarsi and apices of their tibiae infuscate. Lower wings with the median nervure basally almost entirely wanting. Length, 3-5 mm.

Easily distinguished by the not apically attenuate antennae, laterally margined post-petiole, red coxae and trochanters, but above all by the basally pellucid median nervure of the hind wings.

Found in England by Francis Walker; Ireland and the Hebrides (Haliday). Though less abundant than *E. laevigatus*, it is widely distributed; I have taken it at Lakenheath and Farnham in Suffolk, in June; and Mr. W. H. Tuck has sent it to me from Aldeburgh and Tostock, in the same county, in September.

¹ Tostock, Wicken Fen, Shere, Harting, Plumstead, Shifnal, Kilmore, King's Cross in Arran, Huntingfield, Charing in Kent, Crookston, New Forest, Cophorne Common and Greenings near East Grinstead, Norfolk, Bickleigh and Plym bridge in Devon, Land's End, Lasingham in Yorks., Glanvilles Wootton, Hastings District, Guernsey, Essex, Bonhill, Caerketton, Isle of Man, Cornwall, Blackburn. I have taken it in Suffolk at Alderton, Dunwich, Mildenhall, Eye, Felixstowe, Claydon bridge, Bentley Woods, Belstead, Henstead, Finborough Park, Reydon. I have also found it at Burwell Fen in Cambs., and at Brockenhurst and Lyndhurst in the New Forest.

4. *splendens*, Grav.

Mesoleptus splendens, Gr. I. E. ii. 115, ♀. *Exolytus splendens*, Först. Verh. Wien. z.-b. Ver. 1876, pp. 56 et 104, ♂ ♀. *Atractodes splendens*, Thoms. O. E. x. 1021, ♂ ♀. *A. inessor*, Hal. Ann. Nat. Hist. 1839, p. 118.

Head with the vertex narrow, clypeus sub-discreted, cheeks glabrous and nitidulous. Flagellum filiform throughout, basally sub-rufescent beneath. Abdomen black, with the second and the third segments partly or wholly red, the former in ♀ rather longer than apically broad; basal segment margined throughout; terebra very shortly exerted. Anterior legs red, with the coxae black; hind ones black, with the apices of the trochanters, base and apex of the femora, the tibiae and tarsi red. Wings sub-hyaline, with the stigma dull testaceous, radix white and tegulae infusate; areolet pentagonal and apically incomplete. Lower wings with the median nervure basally almost entirely wanting; nervellus sub-opposite. Length, 4 mm.

This species is smaller than *E. scrutator*, with the flagellum filiform throughout and more slender, the coxae and trochanters are black, second ♀ segment longer, vertex narrow, cheeks polished and clypeus sub-discreted.

Bridgman first found it at Brundall in Norfolk, in July; Wilson Saunders subsequently in Surrey; Chitty at Margate, in May; and I have specimens from Ipswich, in 1894; Mildenhall, in June; and Henstead marsh, on flowers, in August. It is probably widely distributed.

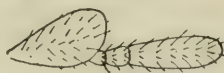
MESATRACODES, Morley.

n. n.

Head transverse, obsoletely pubescent, evenly and not deeply punctate; clypeus distinctly discreted, apically glabrous and truncate, laterally sinuate; mandibles slender, punctate, with the upper tooth the longer; cheeks sub-buccate; maxillary palpi cylindrical; labial with the basal joint clavate, the two following minute and the apical strongly elongate. Antennae elongate, with the five basal flagellar joints apically sub-callose; of ♀ tricoloured, filiform and apically obtuse, of ♂ half as long again as the body and apically attenuate. Notauli elongate but not deeply impressed, mesopleural sulcus wanting; metathoracic costae strong, central area sub-confluent; spiracles circular and directed backwards. Abdomen nitidulous, sub-cylindrical, of ♀ apically compressed; basal segment sub-linear, a little explanate apically, laterally curved and margined throughout, with the spiracles central; terebra not exerted. Legs normal; tibiae short, the front ones distinctly spinulose anteriorly; calcaria strongly curved, onyches short and stout. Wings somewhat narrow; areolet not indicated, fenestra broad and confluent; nervellus intercepted distinctly below its centre.

In many important particulars this genus materially differs from all the *Cryptinae* known to the author, and it were perhaps better treated of in the *Mesoleptini*, near *Callidiotes*, but its facies is so strongly similar to *Atractodes* that it is provisionally here placed, pending the discovery of a

more natural position. It appears to be allied to *Spanotecnus* and *Phobetes* of Förster. I have seen but one species.



Labial palpus of *Mesatractodes*.

1. *properator*, Hal.

Atractodes properator, Hal. Ann. Nat. Hist. 1839, p. 120, ♂ ♀.

Head black, with the clypeus and mandibles rufescent and palpi infusate. Antennae black, rufescent basally beneath; of ♀ nearly the length of the body, basally red, with the four central joints white, of ♂ longer than body and not centrally crenulate. Thorax immaculate; mesonotum closely and evenly punctate, discally deplanate and sub-coriaceous; metathorax somewhat shining, apically sub-produced, with the lateral areae complete; areola of ♂ transversely hexagonal, of ♀ triangularly elongate and confluent with the apically carinate petiolar area. Scutellum black and slightly convex. Abdomen nitidulous, glabrous, red, with the petiole black and anus infusate; basal segment linear and margined throughout, with the post-petiole explanate and glabrous; petiole centrally canaliculate and in ♂ punctate; anus pubescent, terebra not exerted; ♂ valvulae elongate, curved and red. Legs red, with the evenly punctate hind coxae, and tarsi, basally or entirely infusate; all the tibiae externally spinulose. Wings hyaline; stigma narrow and piceous, tegulae and radix ferrugineous. Length, 7 mm.

Haliday himself did not consider this species to belong to *Atractodes*, from which it differs in so many essential points, while presenting a very similar facies, and Holmgren thought it to be allied to his *A. varicornis* (*Callidiotes coxator*, Gr.), with which, indeed, it may prove to be synonymous.

It is recorded from England by Francis Walker, and near Edinburgh in September. Bridgman says it is common in Norfolk, but it is significant that he does not record the common *C. coxator* thence, and the same may be said of Bignell's specimens from Bickleigh, in August. Dr. Capron has taken several females at Shere in Surrey. Bignell's record of *Atractodes albovinctus* from Bickleigh, in September, refers to the present species.

TRIBE.

CRYPTIDES.

SUB-TRIBE.

MESOSTENINI.

The *Mesostenini* are instantly distinguished from the remaining *Cryptides* by the small and quadrate areolet. The two genera here placed have nothing in common but the peculiarly small and quadrate areolet of the wings. In many respects the first resembles certain genera of the *Tryphoninae*, while I am strongly of opinion that the second, which appears to be but little known to modern authors, must be relegated to the *Opinioninae*,

though its anomalous features render it more convenient at present to treat of it in the position it has always hitherto held.

Table of Genera.

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|------|----|---|---------------------|
| (2). | 1. | Abdomen fusiform and broadly red ; thorax dull and punctate | MESOSTENUS, Grav. |
| (1). | 2. | Abdomen linear and not red ; thorax glabrous and nitidulous | NEMATOPIDIUS, Grav. |



Areolet of *Mesostenus ligator*.



Areolet of *Nematopodius formosus*.

MESOSTENUS, Gravenhorst.

Gr. I. E. ii. 750 (1829).

Head short, transverse, posteriorly narrowed ; eyes oval and prominent ; frons with no inter-antennal spine. Antennae longer and more slender in ♀. Thorax pilose, stout, punctate ; apophyses often stout and acute. Scutellum convex, triangular, apically sub-obtuse. Abdomen smooth, shining, convex ; basal segment somewhat curved, laterally margined ; post-petiole sub-convex, often coarsely punctate ; second segment with hind margin callose, the third apically depressed ; terebra deflexed and longer than half abdomen. Legs elongate and slender. Wings normal ; areolet small, rectangular, quadrate, emitting the second recurrent nervure from its apical angle.

Eighteen palaearctic species are known, an investigation of which would probably extend our list from its present meagre proportions. *Mesostenus gladiator*, Scop., should certainly occur in Britain, whence it was erroneously recorded by Marshall in 1870 ; it is parasitic upon *Ammophila*, *Pelopaeus*, *Trypoxylon* and *Osmia*, and differs very considerably from our indigenous species in its entirely black body and very long terebra, bearing similar facies to *Cratocryptus subpetiolatus*. I have already (Ichn. Brit. i. 220) mentioned that *Mesostenus maurus*, Marsh., has nothing in common with the present genus and is, in fact, referable to *Platylabus*, Wesm.

Table of Species.

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|------|----|--|-----------------------|
| (4). | 1. | Apophyses acute ; abdomen ovate ; second segment transverse (MESOSTENUS, auctt.). | |
| (3). | 2. | Clypeus depressed ; segments flat | 1. LIGATOR, Grav. |
| (2). | 3. | Clypeus convex ; segments convex | 2. OBNOXIUS, Grav. |
| (1). | 4. | Apophyses obsolete ; abdomen fusiform-linear ; second segment elongate (STENARAEUS, Thoms.)..... | 3. ALBINOTATUS, Grav. |

1. *ligator*, Grav.

Bassus zonator, Fab. Piez. 97, ♂ (?). *Mesostenus ligator*, Gr. I. E. ii. 760; Ratz. Ichn. d. Forst. i. 147; Tasch. Zeits. Ges. Nat. 1865, p. 111; Thoms. O. E. v. 515 et xxi. 2378; Voll. Pinac. pl. xli. ff. 1 et 2, ♂ ♀.

Head of ♀ with cheeks sub-buccate, of ♂ with facial orbits, a mandibular and sometimes a clypeal mark, white. Antennae of ♂ setaceous, of ♀ centrally white above. Thorax and scutellum immaculate; metathorax scabrous, apophyses obtuse, spiracles linear. Abdomen of ♀ a little compressed laterally and as broad as, of ♂ narrower than, the thorax and oblong-ovate; red or castaneous, with petiole and apical segments black, the sixth to eighth laterally or apically white-margined; post-petiole stout, sub-quadrate, with prominent spiracles, of ♀ trifoveolate; basal segments distinctly punctate; terebra deflexed and a little longer than half the abdomen. Legs elongate, red; trochanters, coxae, hind tibiae, part of their tarsi and in ♂ usually their femora towards the base, black; hind tarsi centrally white in ♂ and often ferrugineous in ♀. Wings somewhat clouded; stigma, radix and tegulae infusate. Length, 10–12 mm.

This species is rendered abundantly distinct by its sub-depressed clypeus, the female's falcately deflexed terebra and trifoveolate petiole, and the male's apically white-margined anal segments.

It occurs in June upon umbelliferous flowers throughout the Continent, where it has been bred from *Bombyx neustria* (Grav.), *Acronycta rumicis* (Laboul.), *Zygaena trifolii* and *Cimbex amerinae* (Brisch.). In Britain it is certainly not rare, though only recorded from Essex by Harwood, who found it at Wivenhoe in June, 1900. Piffard has given me specimens from Felden in Herts.; Thornley from Linwood in Lincs., in June; and Connold has found it in the neighbourhood of Hastings.

2. *obnoxius*, Grav.

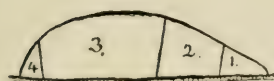
Mesostenus obnoxius, Gr. I. E. ii. 763; Tasch. Zeits. Ges. Nat. 1865, p. 111, ♂ ♀ (nec Voll. Pinac. pl. xli. fig. 4); cf. Entom. 1880, p. 18 et Thoms. O. E. xxi. 2379.

Head black with clypeus convex, sub-tuberculiform; facial orbits of ♂ rarely white. Antennae black, of ♀ somewhat slender and centrally white-banded, of ♂ stouter and immaculate. Thorax punctate; notauli short, not reaching to the centre of the mesonotum; apophyses acute, spiracles oblong. Scutellum black. Abdomen convex and elongate-ovate, broader in ♀; black with segments two to four, apical margin of first and base of fifth, castaneous-red; anus immaculate; post-petiole gradually dilated; terebra less than half the length of the abdomen and hardly curved. Legs slender and elongate; black, with anterior except coxae and trochanters, and the femora towards their base, red; tarsi infusate, hind ones of ♂ centrally white. Wings normal, somewhat clouded; stigma, radix and tegulae black. Length, 10–12 mm.

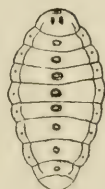
Bridgman (Entom. 1880, p. 18) points out the variation of the male; its areolet may be more or less broad, sometimes very narrow, and the outer

nervure may be so obsolete as to appear wanting ; its abdomen also varies much in width, the normal form being elongate-ovate with the third segment the broadest and parallel-sided, whence the abdomen tapers to its base, but rarely segments two to four are of equal breadth throughout ; the petiolar spiracles appear much more prominent in smaller examples, and the post-petiole is either parallel-sided or gradually explanate towards its apex.

This species occurs throughout central and northern Europe, and has been there bred from *Zygaena Ephialtes*, *Z. trifolii* (Brisch.), and *Z. carniolica* (Laboul.). In Britain it is by no means uncommon ; Brockley in June (Turner) ; Maldon in Essex (Fitch) ; Fairlight, Sussex (Hast. List) ; Brundall near Norwich (Bridgman) ; South Devon (Bignell) ; Botusfleming (in coll. Marsh.) ; common some years on the Cotswold Hills (Watkins, Ent. Rec. 1902, p. 349). Bred at Oxford from *Zygaena trifolii* early in May (Hamm) ; and from *Euchelia jacobaeae* (Buckler's Larvae, ix. Appendix). South and Chapman have bred it at Reigate, and Lyle in the New Forest, from *Zygaena filipendulae*, and Capron took it at Shere in the same county.



Zygaena cocoon.



Larva.



Head of Larva.

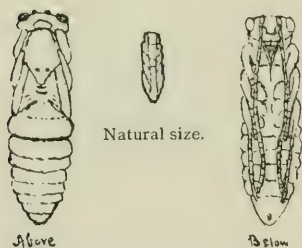
The life history of this species is comparatively well known and I have been enabled, thanks to the kindness of Mr. R. M. Prideaux, to add a little to what was already noted by Bignell and Moncreaff. In April the female lays a solitary egg on the back of a caterpillar of *Zygaena filipendulae*, when the larva emerges in a few days and eats its way through the skin to begin feeding upon the fatty portions of the caterpillar, which is full fed by the end of June. The latter then weaves its cocoon as though in perfect health, and usually retains sufficient strength to assume the pupa state. The parasite has meanwhile been advancing towards maturity at its host's expense, and completes its demolition just before, or soon after, it pupates. The former then proceeds to construct a cocoon of its own within its host's ; this is twelve millimetres in length and six in breadth, a little contracted at both extremities, which are obliquely truncate, and do not reach the apices of the *Zygaena* cocoon. It is sub-ovate and generally longitudinally wrinkled, on account of the contraction of its surface. Upon the outer integument being removed, the parasite's cocoon is revealed ; this is of exactly the same colour as the host's, and within is shining, quite smooth and entirely empty, excepting for the larva ; it is interwoven upon the host's cocoon and is much stouter and more chitinous. The *Zygaena* caterpillar's skin occupies the extreme apex of its cocoon (1) and its chrysalis, of which only the crumpled, compacted skin and chitinous parts remain, is pushed closely on to it. Very rarely the caterpillar's skin is at one end of the *Zygaena* cocoon and the pupa skin at the other. Some-

times the parasite consumes its host before the latter pupates, in which case the remains of the caterpillar are pushed to the apex (1) and the next cell (2) is empty and separated from the apical by a fragile partition erected by the parasite before completing its own cocoon (3); this partition is always present and divided from the parasite's cocoon by a more or less broad space (2). The broader extremity of the host's cocoon is not reached by that of the parasite, so that a little empty cell (4) is left between them; the apices of the parasite's own cocoon are very stout and their surface uneven.

The larva (see fig.) is onisciform, twelve millimetres in length and about six in breadth in repose, deplanate, entirely primrose-yellow and diaphanous with numerous lighter, sub-cutaneous, opaque granules. It has a fleshy lateral border containing the spiracles which are boldly marked by a dot within a circle; this border is distinctly discreted and, together with the anal segment, sub-translucent. There are ten segments, of which the head has the outlines of the mouth organs (see fig.) piceous and two longitudinal frontal marks ferrugineous; the remainder of the head is of the same colour as, though more coriaceous than, the rest of the body, the whole surface of which is covered with extremely close and extremely minute punctures. The eight central segments are furnished dorsally with pseudo-feet, the central ones being the most prominent and powerful. When frightened the larva remains motionless with head retracted and deflexed; it has the power of closing a rent in its cocoon (in March) with a perfectly white substance, and can withdraw at will into half the area of its cocoon, which is curiously convex for so flat a larva.

Before pupating the larva becomes less fleshy, more elongate, narrower and darker in colour; Moncreaff adds (Entom. iv. p. 125) that at the end of January "the eyes become darker and numerous pellets of frass are ejected." The pupa (see fig.) is somewhat light-yellow, with red eyes; it is of the usual Ichneumonid type and still retains its dorsal prolegs. It has the faculty of violently jerking the cocoon by rapidly twisting round and round upon the apex of its abdomen. I have found that it does not become a pupa till quite the end of March, but sometimes by the end of February the waist is beginning to contract and the antennae, legs and wings show through the shell; by the second week in March the whole of the members stand clear of the body, each encased in a transparent covering; next minute atoms of a dark colour, commencing at the head, gradually steal over the body, which in a short time assumes its perfect markings, and by the end of March, in some cases, the insect is perfect. The antennae are then drawn one by one from their cases, the legs and wings quickly follow, the whole envelope is thrown off, and the perfect insect lies for some time within its cocoon before emergence.

Its final ecdysis usually occurs between dusk and midnight, and the imago is extremely vivacious throughout the whole course of its life, which, in the male, lasts only three or four days in confinement. I have found them to emerge between May 15th and June 18th, the latest date being July 3rd, and the males precede the females about eight days.



Bignell is of opinion that this species confines its parasitism (in Britain) exclusively to *Zygaena filipendulae*, and arrives at this conclusion, which is not entirely correct (see Hamm's record, etc., above), by observing, through many years, that it does not emerge from its host's cocoon until the caterpillars are full grown and consequently in a fit state for oviposition; at all events all the formerly recorded emergences, and these are comparatively numerous, have been from this host, which always succeeds in weaving a perfectly formed cocoon. I have attempted to induce bred sexes to copulate in the presence of *Zygaena* larvae; when first introduced the ♂ attempted advances which were repulsed by the ♀, who made a feint of piercing the larvae with her spicula, but the action appeared instinctive rather than deliberate, and the experiment failed.

M. obnoxius appears to be a local species; more than half the specimens I have examined are from Reigate. At Felixstowe I have collected over a hundred cocoons of *Z. filipendulae*, not one of which exhibited a trace of this species. Bignell (Entom. 1880, p. 17) bred twenty specimens from seventy cocoons of the host, which also produced a couple of *Tachina larvarum*, three *Exorista vulgaris* and five *Apanteles* sp. (probably *A. congestus*, as bred from this host by Brischke; see also Ent. Rec. 1902, p. 349¹); and even these are not all the ills that this poor moth is heir to, since *Anomalon fibulator* is said to be frequently parasitic upon it, and *Spilocryptus fumipennis* is another enemy. I have, moreover, dealt somewhat fully with the hyperparasitism of *Hemiteles castaneus*, through *M. obnoxius*, under the former species.

3. *albinotatus*, Grav.

Mesostenus albinotatus, Gr. I. E. ii. 756; Tasch. Zeits. Ges. Nat. 1865, p. 110, excl. var. 1, ♂ ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1879, p. 337 et Thoms. O. E. xix. 2117. *Stenaraeus albinotatus*, Thoms. lib. cit. xxi. 2382.

Head narrowed behind the eyes; frons coarsely punctate and mutic; oral costa not elevated; internal orbits, especially in ♂, whitish. Antennae of ♀ with three central joints white above. Thorax sub-cylindrical, sometimes with a white dot beneath the radix; epomiae short, apophyses sub-obsolete. Scutellum with basal carinae more or less white. Abdomen elongate, sub-fusiform; black with post-petiole, whole of second segment, and usually of the third, red; margins of the sixth and seventh milky white; petiole acutely dentate laterally at the base; post-petiole longer than broad, smooth, with short spiracular but no dorsal carinae; second segment nearly twice longer than broad; terebra nearly as long as the abdomen, slightly deflexed. Legs not stout, red, with coxae and trochanters black; hind tibiae and tarsi, and sometimes in ♀ femora basally with the hind ones beneath, infusate; hind tarsi of ♂ centrally white. Wings somewhat clouded; radix and tegulae infusate; discoidal cell twice broader at apex than at base; areolet transverse, nearly twice broader than long. Length, 9–11 mm.

¹ With regard to *Apanteles congestus*, I may say that in July, 1899, Mr. Prideaux sent me a cocoon of *Z. filipendulae* from which a perfect moth had already emerged and, attached to it, was that of this species whose single larva had subsisted upon the caterpillar with no apparent detriment to it. Is it possible for a parent fly, disturbed in oviposition, to leave so slender a progeny for its host to rear that the latter may sometimes survive to perfect maturity? One would suppose the continual drain upon its strength of even a single *Apanteles* larva to be fatal (cf. also E.M.M. i. p. 73 et Entom. 1866, p. 28). I do not go so far as to assert that six specimens of *Paniscus cephalotes* and a perfect *Arctia menthastri* could emerge from a single pupa of *Dicranura vinula*! (cf. Dale. Mag. Nat. Hist. No. 19).

The hind femora apically above and the centre of their tibiae are rufescent; the ♂ hind tarsal joints two to four are white and its scutellar carinae sometimes immaculate.

This species is very distinct from the preceding in its densely and very finely punctate abdomen, and glabrous, elongate post-petiole; from *M. transfuga*, with which Marshall synonymized it, in the acute lateral prominences at the base of the petiole which, however, are sub-obsolete in the male, in the posteriorly narrower head, the sub-rugosely punctate frons, short pronotal epomiae and the male's immaculate pronotum. It is quite possible that *M. transfuga*, which occurs throughout Europe, may be found with us, but more positive records are needed before introducing it, although it is mentioned as British by Desvignes, in 1856.

In any case the records of this species are extremely vague, and founded solely upon Marshall's mention of it in his 1870 and 1872 Catalogues. It occurs in July and is widely distributed on the Continent, but does not appear to have been yet bred.

NEMATOPODIUS, *Gravenhorst*.

Gr. I. E. ii. 955 (1829).

Head transverse and basally rounded; eyes sub-orbulate; clypeus distinctly discreted, convex and apically incised; cheeks short and deeply sulcate. Antennae slender, filiform with the joints gradually a little incrassate and pale-banded towards the obtuse apex. Thorax gibbous and gradually contracted posteriorly; mesopleural sulci strong; metathorax sub-declined and somewhat convex throughout, pubescent, strongly nitidulous, distinctly, sparsely and evenly punctate beyond the centrally angulated basal costa; spiracles circular and apophyses entirely wanting. Scutellum triangular, hardly convex, apically obtuse. Abdomen narrow, elongate, convex, glabrous and nitidulous; basal segment linear, with prominent spiracles; second segment obsoletely punctate and, with the remainder, parallel-sided or gradually dilated towards the anus; terebra shortly exerted with sub-spatulate valvulae. Legs slender, elongate, with front coxae centrally obtusely denticulate and the hind tibiae sub-intumescens. Wings narrow with areolet entire, small and sub-quadrate, emitting recurrent nervure from near its apex.

The position of this genus, which I am now able to confirm as British, has never been satisfactorily decided. Gravenhorst wished to place it between *Cryptus* and *Echthrus*, but the areolet is quadrate. Taschenberg says its conformation is similar to that of *Ischnus*, and that it has nothing in common with *Mesostenus* but the shape of the areolet. Subsequent authors have nothing to add and, indeed, in our present artificial classification no other position is open to it. I am strongly of opinion that it is closely allied to *Habrocryptus minutorius*, Fab., but the females of that genus are of much stouter build, and the exerted terebra and mesopleural sulci preclude it from *Ischnus*, as now understood. I can, moreover, recall no genus with the front coxae similarly modified. We now possess both the palaearctic species.

The so-called "*Nematopodius*" *ater* has nothing to do with this genus (*cf.* Bridg.-Fitch, Entom. 1883, p. 38).

Table of Species.

- | | | | |
|------|----|--|--------------------|
| (2). | 1. | Clypeus apically emarginate; metanotum with basal costa only | 1. FORMOSUS, Grav. |
| (1). | 2. | Clypeus apically bidentate; metanotum fully areated | 2. LINEARIS, Grav. |

1. formosus, Grav.

Nematopodius formosus, Gr. I. E. ii. 957; S. v. Voll. Schets. I. pl. i. fig. 24, ♀; Tasch. Zeits. Ges. Nat. 1865, p. 112; Schm. Opusc. Ichn. viii. 578, ♂ ♀.

A slender and strongly elongate species. Head black, with face, mouth, cheeks and nearly the whole of the orbits pale stramineous, and the mandibles apically ferrugineous; clypeus centrally emarginate. Antennae longer than half the body with usually two joints, far beyond the centre, white above and ferrugineous beneath. Thorax black, with most of the pronotum and the callosities before the radix white; sometimes also the sternum, pleurae and apex of the metathorax rosy, with rarely the metathorax mainly red, only the disc being more or less black. Scutellum wholly or laterally white, with its apex, like the post-scutellum, badious. Abdomen narrow and twice longer than the thorax, pilose and very smooth; black, with all the segments narrowly white-margined, and in ♂ with segments three to five sub-badious; first segment linear, basally distinctly denticulate; post-petiole twice longer than broad, of ♀ very slightly intumescent with spiracles not behind its centre; terebra about one-fifth of the length of the abdomen, infusate with red spicula, and pilose, apically obtuse valvulae. Legs slender; the anterior testaceous, with coxae and trochanters pale stramineous; hind ones nigrescent, with femora and apices of coxae dark testaceous; hind tibiae contracted and slightly curved at the base; front coxae obtusely denticulate centrally beneath. Wings narrow, hyaline, with stigma piceous; radix and tegulae white; nervellus strongly post-furcal, intercepted in its centre, with the humeral nervure and apex of the posterior entirely wanting. Length, 7-9 mm.

The rufescent markings are usually much more noticeable in the male. The post-petiole is not apically excised, as figured by van Vollenhoven.

If this species, which is almost unrecorded from northern Europe, has hitherto been found in Britain at all, it must have been extremely rare. It is said to be taken in June, July and September, on *Umbelliferae*, walls, palings and old wood (*cf.* Tasch. Hym. Deut. p. 58), and to be usually gregarious throughout central and southern Europe. Marshall's record of it in his 1870 Catalogus is probably based upon the single male in the National Collection, and certainly no one has found it here since that time, until I was so fortunate as to take four females upon the window-pane in my bedroom at Monks' Soham House, Suffolk, during July 1st to 16th, 1905. I should suspect them of preying upon some xylophagous coleopteron devouring the old timber of which the house is mainly composed, and the occurrence of four examples in the same situation proves their presence to have not been accidental. None occurred there in 1906.

2. *linearis*, Grav.

Nematopodius linearis, Gr. I. E. ii. 958; Schm. Opusc. Ichn. 578, ♂; cf. Tasch. Zeits. Ges. Nat. 1865, p. 113.

Head black, broader than the thorax, with the vertex and temples strongly convex; face elongately pilose and immaculate; clypeus distinctly discreted, apically rounded and very strongly bidentate in the centre; mandibles broad and flavescent with the teeth of equal length. Antennae slender and piceous, basally testaceous beneath, with the first flagellar joint four times longer than broad and half as long again as the second. Thorax entirely black and strongly nitidulous; mesonotum abruptly declived apically, with deeply impressed and sub-parallel notauli, which do not extend quite to the scutellum; metathorax sub-glabrous, with all the areae entire and sharply defined; areola slightly longer than broad, parallel-sided, basally curved, apically strongly and truncately costate; petiolar area ill-defined and half length of the metanotum. Abdomen elongate-linear, apically sub-compressed and densely pilose; basal segment not apically explanate, with the spiracles (as in *N. formosus*) slightly before the centre; post-petiole smooth and shining; black with the central segments, especially apically, pale. Legs strongly elongate, testaceous, hind pair black; anterior coxae and trochanters, and the apices of the hind coxae, stramineous; intermediate coxae with a small tooth before the apex beneath, front ones obtusely dentate. Wings hyaline and somewhat narrow; areolet entire, small and quadrate-pentagonal; fenestrae wanting, nervellus opposite and intercepted far below the centre. Length, 8 mm.

It is hardly necessary to indicate the very obvious differences between this species and *N. formosus*; the divergence in shape of the areolet is far less than Taschenberg, who thought this species referable to *Ischnus*, would lead us to suppose, and no doubt remains that it is truly congeneric with *N. formosus*. After a careful study of both species I am strongly of opinion that they should be placed in the *Ophioninae*, on account of the neuration, irregular areolet, apically sub-compressed abdomen, but especially with regard to the ante-medial petiolar spiracles.

The only previous record of this species, which is a very unexpected addition to the British list, is Gravenhorst's of 1829, "Marem unicum etruscum a Sanvitale mihi misit." I possess a single male kindly given me by the late Dr. P. B. Mason, which was captured at Greenings, near East Grinstead, in Surrey, in July, 1872, by Wilson Saunders.

SUB-TRIBE.

CRYPTINI.

The present sub-tribe will easily be recognized by its always entire and pentagonal areolet, which very often has the sides exactly parallel, by the exareated metathorax and large size. In the metathoracic conformation, the species more closely approach the sub-petiolate *Pimplinae* than any others of the present sub-family. It is by no means an easy matter to synonymize Thomson's genera with the very elaborate ones previously erected, with no indication of types, by Förster, but it is thought that the following table will serve as a sufficiently explicit guide to the various genera into which the *Cryptus*, *Linoceras* and, in part, *Echthrus*, of Marshall's Catalogue have recently been divided.

Table of Genera.

(18).	1.	Radius of upper wing short and straight ; median of lower angulated at nervellus.	
(15).	2.	Post-petiole discally curved ; mesonotum declived in front, notauli distinct.	
(14).	3.	Discoidal cell obtuse below and not extending to below apex of areolet.	
(13).	4.	Areolet large and usually parallel-sided.	
(6).	5.	Areolet laterally slightly convergent ; anus immaculate	PYCNOCRYPTUS, <i>Thoms.</i>
(5).	6.	Areolet parallel-sided ; anus usually white.	
(8).	7.	Petiole tubercles far behind centre.....	SPILOCRYPTUS, <i>Thoms.</i>
(7).	8.	Petiole tubercles only just behind centre.	
(10).	9.	Coxal area distinct ; onychii not stout ...	HOPLOCRYPTUS, <i>Thoms.</i>
(9).	10.	Coxal area wanting ; onychii stout and often large.	
(12).	11.	Onychii shorter than second tarsal joint	GAMBRUS, <i>Först.</i>
(11).	12.	Onychii longer than second tarsal joint ...	ARITRAINIS, <i>Först.</i>
(4).	13.	Areolet somewhat small and distinctly convergent.....	HABROCRYPTUS, <i>Thoms.</i>
(3).	14.	Discoidal cell rectangular below and extending to below apex of areolet	CAENOCRYPTUS, <i>Thoms.</i>
(2).	15.	Post-petiole discally straight ; mesonotum not declived ; notauli obsolete.	
(17).	16.	Lower basal nervure pellucid ; epomia obsolete	IDIOLISPA, <i>Först.</i>
(16).	17.	Lower basal nervure entire ; epomia short but distinct	GONIOCRYPTUS, <i>Thoms.</i>
(1).	18.	Radius of upper wing long and curved ; median of lower wing straight.	
(20).	19.	Second joint of palpi triangular ; abdomen cyaneous	MEGAPLECTES, <i>Först.</i>
(19).	20.	Second joint of palpi cylindrical ; abdomen not cyaneous.	
(26).	21.	Basal flagellar joints apically incrassate ; post-petiole explanate.	
(23).	22.	Head transverse, clypeus mutic ; petiole spiracles not central	CRYPTUS, <i>Fab.</i>
(22).	23.	Head cubical, clypeus mucronate ; petiole spiracles central.	
(25).	24.	Mesosternal sulcus reaching base ; metanotum with apical costa	NYXEOPHILUS, <i>Först.</i>
(24).	25.	Mesosternal sulcus not reaching base ; metanotum with basal costa.....	XYLOPHURUS, <i>Först.</i>
(21).	26.	Flagellar joints cylindrical ; post-petiole linear	ACRORICNUS, <i>Ratz.</i>

PYCNOCRYPTUS, Thomson.

Thoms. O. E. v. 500.

Head sub-triangular, vertex declived behind the ocelli ; epistoma and clypeus sub-convex, the latter apically mutic ; cheeks elongate and not buccate. Antennae of ♀ filiform, spiral, white-banded, with post-annellus a little longer than the scape. Metathoracic spiracles sub-rotund. Abdomen elongate, terebra far-exserted and sub-deflexed ; first segment a little dilated and elevated, with post-petiole hardly margined, the second shining and not alutaceous, sparsely punctate ; anus not marked with white.

Hind femora stout, front tibiae sub-inflated; hind tarsi shorter than tibiae. Wings with areolet large, and a little convergent; radial nervure short; nervellus opposite and intercepted below its centre.

This genus differs from *Cryptus* in its sub-cylindrical thorax, the petiolar area not reaching the centre of the metanotum, its sub-rotund spiracles; in the white radix and large, slightly convergent areolet; in the elongate terebra, shining and not alutaceous second segment, the fifth to the seventh bearing a gradually expanding membrane; and in the head and thorax in both sexes being immaculate.

A second species of this genus has been described in the female sex from the Mediterranean region by Kriechbaumer, but it is hardly likely to occur in Britain.

1. *peregrinator*, Linn.

Ichneumon peregrinator, Linn. F. S. 402, ♀. *Cryptus peregrinator*, Gr. I. E. ii. 605 et Suppl. i. 705, ♀, excl. var. 1; Tasch. Zeits. Ges. Nat. 1865, p. 99, excl. ♂; Tschek, Verh. z.-b. Ges. 1870, p. 132, ♂ ♀. *C. analis*, Gr. I. E. ii. 560; Ste. Ill. M. vii. 289; Tasch. Zeits. Ges. Nat. 1865, p. 91, excl. ♀. *C. varipes*, Brisch. Schr. Ges. Danz. 1881, p. 332, ♂. *Pycnocryptus peregrinator*, Thoms. O. E. v. 500 et xxi. 2365, ♂ ♀.

Shining and punctulate, with very slight white pubescence. Head immaculate; clypeus discreted, apically rounded, laterally narrowed, with a transverse central impression; epistoma slightly prominent; frons impressed and punctate. Antennae short and somewhat slender; of ♀ with the central joints seven to eleven white and the first flagellar barely more than twice longer than broad. Thorax and scutellum black, the former sub-cylindrical with the metanotum gradually declived, finely and densely rugulose-punctate, of ♂ longitudinally; lateral areae entire and punctate with their apical margin fine and curved; the petiolar small and more coarsely sculptured, basally narrow, arcuate and usually incomplete; apophyses weak, spiracles small and sub-circular; coxal areae of ♂ produced. Abdomen very finely punctate, of ♀ ovate-fusiform, strongly nitidulous and as broad as the thorax, of ♂ linear-fusiform; black with segments two to four entirely, the first entirely in ♀ and apically in ♂, the fourth basally and laterally, red; the sixth or fifth to seventh in ♀ pale; basal segment elongate, of ♀ slightly curved laterally with the apical angles obtuse, of ♂ sub-linear, glabrous and scarcely at all explanate; post-petiole of ♀ very smooth, convex and slightly longer than broad; terebra about as long as abdomen. Legs short with femora stout; red with coxae, trochanters, apices of hind femora and of their tibiae, ♂ with anterior and ♀ sometimes with the intermediate femora basally, black. Wings somewhat narrow, clouded; tegulae dark, radix stramineous, nervelet of variable length; areolet pentagonal with its sides only slightly convergent. Length, 5-8 mm.

The female, and rarely the male also, has the hind legs mainly black; sometimes the male has the intermediate femora to beyond their centre, the hind femora and tibiae entirely, black, with or without the third and fourth tarsal joints white; the extent of the red coloration upon the basal segment is also variable. Thomson says the male of Gravenhorst's *C. analis* appears to belong to this species on account of its white radices,

rather than to *G. titillator*, to which Taschenburg, who examined the original types, assigned it.

The ♂ variety *analis*, which Tschek is satisfied appertains to this species, and which is much commoner in Britain than the typical form, of which he possessed but a single example, has the hind legs entirely black, with the tarsi often centrally white.

Schmiedeknecht is of opinion that this species should be ascribed to Gravenhorst, and that the previous authors confuse more than one species under this name, but the latter's references to Linnaeus, Fourcroy, Gmelin, Olivier and Thunberg appear to be sufficiently exact.

The larva, Bouché tells us (Naturg. 142), is like that of *G. titillator*, curved and cylindrical with inflated lateral margins; white and acuminate with erect isolated bristles; the rounded head bears two short obconical antennae; the dorsal segments are somewhat humped and the apical one is narrowed; its length is two lines. Its cocoon is grey and is intermixed with dirt and fragments of wood fibre. It preys upon *Botrys sambucalis*, in which its larvae live, two or three together, and subsequently pupate in close proximity to one another.

P. peregrinator is distributed throughout Europe and extends to Algeria. It is said to have been bred from *Lasiocampa quercus*, and to be found upon flowers; Hope sent the female to Gravenhorst from Netley; Bridgman found it at Norwich, Brundall and Cromer, in June and August; Bignell at Exminster, at the end of July; Hamm at Tubney and Shotover near Oxford; Fitch at Maldon in Essex; and it is recorded from the Hastings district. These notices are, however, very meagre since it is an abundant species everywhere, and I have found it at Burwell in the Cambs. fens, at Belstead and Foxhall near Ipswich, on *Angelica* flowers in May and August; and at Huntingfield near Faversham, on *Heracleum* flowers. In July, 1898, Mr. Bedwell and I bred a great many ♂♂, together with ♀♀ of *Gambrus ornatus* (a curious and suggestive circumstance!), from the cocoons of *Zygaena trifolii* on the long grass stems in Oulton Broad in Suffolk, and in this case the parasitism was solitary, the Cryptid cylindrical cocoon being spun at one extremity of the host's; in one case I found the interwoven cocoons of a hyperparasitic *Apanteles* which failed to attain maturity.

I possess females from Mablethorpe and Linwood Common in Lincs., Retford and South Leverton in Notts. (Thornley); Lyndhurst (Adams); Dartmouth Park, N.W. London (Newbery); Blackheath and Plumstead (Beaumont); Bournemouth (Bradley); Westbury (Charbonnier); Guestling (Bloomfield); Ely (Cross); Tostock near Bury St. Edmunds (Tuck); Greenings in Surrey (W. Saunders); Kingsdown in Kent (Sladen); Felden in Herts. (Piffard); Shere (Capron); and Kerry in Ireland (The Irish Naturalist, 1903, p. 68); St. Margaret's Bay and Huntingfield in Kent, from June to September (Chitty); Matlock (Tomlin); New Forest (Miss Chawner). The var. *analis* of the male has occurred to me plentifully on flowers of *Heracleum sphondylium*, in June and July, and sometimes flying low over damp grass, towards the end of May, at Wicken and Burwell Fens in Cambridge, Oxshott in Surrey; Bramford, Orwell, Wherstead, Mildenhall, Farnham, Henstead, Bentley Woods, Foxhall and Barham in Suffolk. Evans took the female at St. David's in Fife, in June, 1900.

SPILOCRYPTUS, *Thomson*.

Thoms. O. E. v. 501.

Head with vertex declived behind ocelli; clypeus apically sub-mutic; epistoma not or hardly convex. Antennae of ♀ filiform and white-banded. Metathorax apically truncate; coxal areae indeterminate; spiracles generally small and sub-circular. Abdomen not strongly convex, nearly obovate, centrally red; seventh segment with disc entirely, and of the sixth and the eighth partly, white; petiolar spiracles far behind the centre of first segment; venter strongly plicate; terebra normal and straight, spicula apically spinulose. Tibiae nearly mutic, front ones more or less incrassate. Upper wings with areolet large and parallel-sided; the lower with nervellus sub-opposite, intercepted below or nearly in the centre.

This genus differs from *Hoplocryptus* in the shorter abdomen of the female, in having the petiolar spiracles far behind the centre, the lateral carinae before the spiracles obsolete but basally dentate, and the apex of the spicula hastate; the petiolar area of the metathorax incomplete above and laterally dentate or cristate, with its spiracles generally round.

Twenty-three palaearctic species are here included, together with three others doubtfully (of which we may consider *Cryptus amoenus* to be correctly placed), by Schmiedeknecht, who retains Förster's name *Agrothereutes* sub-generically to include those kinds whose females are brachypterous.

Table of Species.

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|-------|-----|--|------------------------------|
| (10). | 1. | Spiracles circular and small; hind tibiae distinctly white basally. | |
| (9). | 2. | Abdomen stout, its post-petiole not white;
♀ macropterous. | |
| (6). | 3. | Cheeks narrow. | |
| (5). | 4. | Clypeus convex; ♀ front coxae red, ♂
scutellum white | 1. INCUBITOR, <i>Ström.</i> |
| (4). | 5. | Clypeus deplanate; ♀ front coxae and
♂ scutellum black | 2. CIMBICIS, <i>Tschek.</i> |
| (3). | 6. | Cheeks buccate. | |
| (8). | 7. | Antennae of ♀ tricoloured; ♂ fifth seg-
ment broadest, face black | 3. MIGRATOR, <i>Fab.</i> |
| (7). | 8. | Antennae of ♀ bicoloured; ♂ second seg-
ment broadest, face often white | 4. FUMIPENNIS, <i>Grav.</i> |
| (2). | 9. | Abdomen of ♂ slender, its post-petiole
white-marked; ♀ brachypterous | 5. ABBREVIATOR, <i>Fab.</i> |
| (1). | 10. | Spiracles oval and usually large; hind
tibiae not white-marked. | |
| (12). | 11. | Scutellum and pronotum white | 6. ADUSTUS, <i>Grav.</i> |
| (11). | 12. | Scutellum and pronotum black. | |
| (14). | 13. | Apophyses acute; clypeus hardly dis-
creted | 7. NUBECULATUS, <i>Grav.</i> |
| (13). | 14. | Apophyses wanting; clypeus distinctly
discreted | 8. AMOENUS, <i>Grav.</i> |

i. incubitor, Ström.¹

Ichneumon incubitor, Ström, Trondj. Selsk. Skr. 1768, p. 348, ♀ (*nec* Linn.). *Cryptus incubitor*, Gr. I. E. ii. 590; Ste. Ill. M. vii. 291, ♀; Holmgr. Sv. Ak. Handl. 1854, p. 52; Tasch. Zeits. Ges. Nat. 1865, p. 104, excl. ♂; Tschek, Verh. z.-b. Ges. 1870, p. 415, ♂ ♀. *C. pygoleucus*, var., Gr. I. E. i. Suppl. 702; Tasch. Zeits. Ges. Nat. 1865, p. 103, var. 1, ♂. *Spilocryptus incubitor*, Thoms. O. E. v. 502 et xxi. 2366 (part); cf. Brisch. Schr. Nat. Ges. Danz. 1881, p. 334. Var. brachypt. *Agrothereutes batavius*, Voll. Tijds. v. Ent. xvi. p. 209, pl. ix. fig. 1; Pinac. pl. xxxvii. fig. 2, ♀.

Head moderately narrowed and a little rounded posteriorly with the face transverse; cheeks and temples narrow, the latter somewhat flat; frons deplanate, clypeus slightly prominent, laterally depressed, apically sub-compressed and impressed; of ♀ with internal orbits usually narrowly white, of ♂ with face except sometimes a cordiform mark, orbits, part of mandibles and the mouth white. Antennae somewhat slender, filiform; of ♀ infusate, with basal flagellar joints fulvous and the central ones white; scape of ♂ fulvidous beneath. Thorax black; mesonotum nitidulous and not very closely punctate; metanotum not coarsely but very closely punctate, with petiolar area basally incomplete and the lateral areae entire; spiracles small and circular; apophyses obsolete in ♂, acute in ♀; of ♂ with pronotum, callosities before and beneath radix, and usually marks in the petiolar area, white. Scutellum black; of ♂ entirely, as well as the post-scutellum, white. Abdomen finely punctulate, hardly alutaceous, of ♀ broader than the thorax and oblong-ovate, of ♂ narrower and linear-fusiform; black, with second and third segments, apical half of first, and the fourth mainly or basally or laterally at the base, red; the fifth mainly black; seventh, and often in ♀ the sixth, apically white; ♂ with thyridii, petiole and apex of post-petiole flavous-white; post-petiole convex, glabrous and scarcely broader than long, with the apical angles sub-obtuse, of ♀ canaliculate and gradually a little dilated apically, longitudinally foveate basally; second segment with fine and transverse aciculation; terebra a little shorter than half abdomen, distinctly hastate. Legs slender and red; only the anterior coxae and trochanters black; hind femora at apex and their tibiae, excepting their white basal band, black; hind tarsi centrally paler in ♀ and broadly white, together with nearly the whole of the anterior coxae, trochanters and calcaria, in ♂. Wings hyaline, with a slightly darker central fascia; radius apically straight in ♀, slightly curved in ♂; radix and tegulae white, latter of ♀ black; areolet pentagonal, moderately convergent above, not quadrate; nervellus intercepted obviously below its centre. Length, 8-10 mm.

The female described by Thomson, who confuses this species with *S. cimbicis*, differs from Gravenhorst's description only in the very narrowly white internal orbits, the black anterior coxae and basally black anterior femora.

This species may be known from *S. cimbicis* by the conformation of its clypeus, which is, in both sexes, prominent and not on the same plane as the face; the female has all the coxae and the base of the antennae red, the wings clouded, the abdomen broader than the thorax and the terebra

¹ Thomson says that Linné's *Ichneumon incubitor* is referred by the older authors (Dalman, Ljungh and Zetterstedt) to this species, and he consequently cites Gravenhorst as the author of *Barichneumon incubitor* (cf. Ichn. Brit. i. 90). Gravenhorst, however, is most explicit that the *Barichneumon* is Linné's species, and the *Spilocryptus* that of "Stroem Norske Selsk. Skr. iv. p. 318, n. 65 (*haud* Ichn. *incubitor* auct.)." Thomson adds "Troligen ar *C. cimbicis* (Tschek) samma art," but Tschek is at considerable pains to indicate the distinction between his species and the present.

only slightly shorter than half the abdomen. The colour of the scutellum will at once distinguish the male from Tschek's species.

A. batavus is given by van Vollenhoven (Pinac. p. viii. Syst. Lij.), without hesitation, as synonymous with this species; it is a brachypterous variety with the first segment, hind tarsi and their tibiae, excepting the white base, unicolorous red. The Rev. E. N. Bloomfield first found it in Britain, as recorded by Bridgman (Trans. Ent. Soc. 1881, p. 154), in a sandpit in Guestling Wood, near Hastings, in September; and Hamm, Elliott tells me, has taken it at St. Helens in the middle of July. My own experience is that this form is much commoner than the macropterous one, since I have found it in September, running in sandpits and at the roots of reeds by the river Gipping at Ipswich, where I once bred it in May from an unknown host; and Piffard has several times taken it at Felden in Herts. If further proof of the association of the brachypterous form with *S. incubitor* were needed, it is abundantly supplied by Bowdler, who has sent me about a dozen of both forms captured together during September, 1898; they were both running over low plants in a lane at Oswaldtwistle in Lancashire in some numbers.

Stephens found *S. incubitor* near London in June; Bridgman at Norwich, and he adds that it has been bred from *Saturnia carpini*; I have seen a specimen bred from the same host by Bradley at Barmouth. It would also appear to prey upon *Euchelia jacobaeae*, *Psyche viciella*, *P. atra*, *Trichiosoma lucorum*, *Cimbex variabilis* and *Hylotoma rosarum* (cf. Entom. 1883, p. 36), but it is almost certain that in the case of the Tenthredinid hosts, the next species should have been cited. Thornley has taken the macropterous female at Linwood Warren in North Lincs., and I once found it on the flowers of wild carrot at Peasenhall, in Suffolk, towards the end of July.

2. *cimbicis*, Tschek.

Cryptus incubitor, Ratz. Ichn. d. Forst. i. 142; ii. 123, ♂; Tsch. Zeits. Ges. Nat. 1865, p. 104, excl. ♀. *C. cimbicis*, Tschek, Verh. z.-b. Ges. 1870, p. 412, ♂ ♀; cf. lib. cit. 1872, p. 250. *Spilocryptus incubitor*, Thoms. O. E. v. 502 et xxi. 2366 (part).

Shining and punctate. Head black, narrowed and rounded posteriorly; cheeks and temples sub-buccate; epistoma prominent; clypeus deplanate, laterally depressed and apically slightly impressed transversely in the centre; frons flat, with a slight central sulcus; of ♀ with facial orbits sometimes pale; of ♂ with mouth, part of mandibles, orbits and a central facial mark white. Antennae of ♀ centrally white, not attenuate apically, with first and second flagellar joints of equal length; of ♂ with scape white beneath. Thorax black, of ♂ with pronotum and a line below the radix white; meso- and meta-notum of equal height, the latter uniformly convex with the lateral areae complete and densely rugulose, with the basal costa sub-obsolete and curved, the apical wanting, and the petiolar area small, emitting the apophyses, which are wanting in the ♂, below its vertex. Scutellum flat, distinctly narrowed apically, diffusely punctate and black in both sexes. Abdomen of ♀ oblong-ovate, of ♂ linear-fusiform; centrally red, anus white; basal segment narrow and very finely punctulate, of ♀ slightly curved to the small spiracles, with the post-petiole red and often black-marked, as long as broad, with no carinae nor sulci, with the apical angles acute and the margin emarginate, of ♂ narrow, red and very slightly explanate, with spiracles somewhat prominent

and the post-petiole longer than broad; terebra one-third of the length of the abdomen. Legs with hind femora red, apically black; ♂ with anterior coxae and trochanters white, black-spotted and the hind ones black, also with base of tibiae, sometimes an obsolete spot beneath the hind trochanters and the hind tarsal band, white, its anterior tibiae and femora fulvous; of ♀ with anterior tibiae and femora red and black-lined, the hind coxae red and black-marked, and the base of the tibiae white. Wings hyaline; areolet pentagonal, broad above; nervelet wanting, nervellus intercepted far below its centre; tegulae and radix white, former in ♀ black. Length, 9-10 mm.

The ♀ may be known from that of *S. migrator* by its more elongate form, narrower basal segment, unclouded wings, etc. The cheeks are sub-intumescant, epistoma prominent, clypeus very flat and on the same plane as the face, with its apical fovea as in *S. incubitor*, the antennae are exactly filiform with the two basal flagellar joints of equal length, the metanotum uniformly convex, petiolar area small, the scutellum flat and apically narrowed and diffusely punctate, and the abdomen is more rounded laterally than is that of *S. incubitor*. The ♀ has the basal segment somewhat narrow and slightly curved apically, the post-petiole not twice broader than the petiole and as long as broad, with its apical angles acute and the apical margin deeply emarginate laterally, without carinae or sulci. The ♂ has the basal segment narrow, slightly explanate apically with sub-prominent tubercles, its post-petiole scarcely longer than broad with the sides curved, as in the female.

Ratzeburg, whose *C. incubitor* appertains to this species, says it is extraordinarily similar to *S. migrator*, though somewhat more slender, with the metathorax only feebly rugose-punctate and nitidulous before the basal transverse costa.

This species is also extremely closely allied with *S. incubitor*, from which it may be distinguished by the points enumerated under the latter, but its exclusive parasitism upon *Tenthredinidae* is very noticeable.

In January, 1898, I found four or five cocoons of *Trichiosoma tibialis*, Leach, on whitethorn at Westerfield, near Ipswich, all of which contained empty cocoons of *C. cimbicis*. From a batch of the host's cocoons from Sudbury, Suffolk, one crippled ♂ emerged at 11-30 p.m. on June 30th, 1899; a second before 9 a.m. the next morning, and three more at 3-10

in the afternoon; a sixth ♂ emerged on the 3rd July, and a seventh, with the only ♀, on the 5th; twelve more ♂ ♂ emerged before 4 p.m. on the 7th. Among eleven of the host's cocoons, found at Ipswich on 23rd February, 1900, was one containing fifteen or twenty old cocoons of the parasite, together with the host larva's skin, but with no trace of its pupa, pointing to the conclusion that they emerge from the host's larva shortly after it has constructed its cocoon. Inside each parasite's cocoon was the larva skin, forming a dark mass at the extremity opposite to that through which it had emerged. The parasite's cocoons are rather flimsy, dirty white, 8 mm. in length, nearly 3 mm. in breadth, and often interwoven upon each other. In one cocoon was a dead ♀ with the petiole bent back upon the metanotum and the apices of all the femora contracted on to the thorax, with their tibiae pressed closely to them. The parasite had emerged through three distinct orifices in the *Trichiosoma* cocoon.



Pupa of *Trich.*
"*Oxyacanthae*."

Mr. Ransom sent me twenty-one cocoons of the same host from Sudbury in March, 1900, and of these eight contained living larvae of *C. cimbicis* in their own cocoons; one, pupae of a Chalcid; three, *Trichiosomae* which had died after shedding the larval skin, leaving only nine healthy insects, a very small proportion.

The larva of *C. cimbicis* is soft, fleshy, without setae, and entirely pale primrose, without any markings whatever; the lateral border is well defined. There are twelve segments (not 13 or 14 as figured by Westwood, Mod. Intro. ii. p. 140, fig. 76), a rather darker sub-cutaneous very narrow dorsal line, and a conspicuous dark sub-cutaneous cloud occupying the centre of the back. Between this dark ground-work and the skin are numerous large whitish and dull bodies at irregular intervals, surrounded by innumerable circular granules, which appear to pretty evenly occupy the whole of the sub-cutaneous area throughout the insect. At first I could detect no distinct head; later the larva moved and I found it possessed of a well developed, retractile head with large eyes, clypeus and a powerful pair of bifid mandibles, all of which are outlined with ferrugineous colouring. The larva is 6 mm. in length. Its cocoon is quadrilateral, divided from each other by an extremely fine papyraceous fabric, and is $7\frac{1}{2}$ mm. in length. This dividing partition is doubtless a prevention against epidemics, since in one cell I found a dead and mouldy larva with quite healthy ones in the adjoining cells.

The Chalcid pupae are of interest to us as being, very probably, hyperparasitic upon *C. cimbicis*. They are entirely orange, with a distinct central furrow on the face, and sanguineous between the apices of the mandibles. All the limbs, etc., are quite visible, being packed away upon the breast. These pupae were in no cocoon of their own manufacture, but loosely falling about inside those of the *Trichiosomae*, and they fell out at once upon the latter being opened; only one was attached, perhaps accidentally, to a dead, mouldy, and shrivelled *Trichiosoma* larva, whence they had all emerged. In all there were ten of these pupae, which appeared quite rigid and immovable; some had a long anal appendage, some had not. This cannot be a terebra, and consequently I am inclined to think them some species of *Pteromalus* rather than the same as Ratzeburg's *Torymus*. The imagines began to emerge on 21st May following, but they were unfortunately crushed by the Continental post.

Of the eight cocoons of *Trichiosoma tibialis* containing *C. cimbicis*, sent by Mr. Ransom, I discovered on 23rd May that one contained a *C. cimbicis* cocoon, which was inhabited by seven hyperparasitic larvae. These last obviously pertained to a species of *Pteromalus*, since they exactly agree with that figured by Marshall in the E.M.M. 1895, p. 253, excepting only that they are somewhat more cylindrical and the segmentation is quite distinct. They are pale chocolate colour with the apical extremity nearly colourless and a greater sub-cutaneous density, arising probably from the alimentary canal. In the cocoon was also the larva of *cimbicis*, reduced to a very small and shapeless mass of a deep brown colour. The Chalcid larvae varied greatly in size, some being $2\frac{1}{2}$ mm. in length, and some only $1\frac{1}{2}$ mm. These larvae cannot, I think, belong to the same species as the above Chalcid pupae, since the latter occupied the whole interior of the *Trichiosoma* cocoon, and these larvae occupied only one *cimbicis* cocoon, the surrounding cocoons containing healthy parasite larvae. Westwood

(Intro. ii. 99) says he bred both the parasite and specimens "of one of the Pteromalidae" from a single cocoon.

It is interesting to note that the host emerges between the 10th and 27th of April, and the Cryptid (as also in the case of *Mesostenus obnoxius*), very much later, sometimes not till the second week in July, when the host's larvae may be supposed to be in a fit condition for oviposition; what Bignell records as *C. migrator*, emerging in Devon at the end of May, is, however, evidently the present species.

It is a common species, occurring probably wherever its host is found; I have also specimens from Felden and Stowmarket bred from *Trichiosoma tibialis*. Fred. Smith mentioned at a Meeting of the Ent. Soc., 7th March, 1842, that he had reared the same species of *Cryptus*, doubtless *cimbicis*, from both *Trichiosoma lucorum* (= ? *tibialis*) and *Epipone levipes*; this is the only record from Aculeates, and I am certainly of opinion that some error must have crept into Bignell's record of it, bred by Dr. Mason from *Thecla W-album* (Buckler's Larvae, ix. Appendix). Cameron, in Brit. Phyt. Hym., records it as parasitic upon *Trichiosoma betuleti* (= *tibialis*), on *T. lucorum*, Lin., and on *Cimbex sylvarum*, Fab. There are females in the Hastings Museum; Bridgman bred it from *T. betuleti* at Norwich; Bignell captured it early in July; and Harwood records it from Essex; Beathe has bred it at Mickleham, in June. The *Cryptus* is sometimes destroyed by *Hemiteles areator*; on April 12th, I have bred a female of the latter species from a cocoon of *Trichiosoma* which was then filled with the *Cryptus* larvae; it emerged through a roughly circular hole, exactly one millimetre in diameter, low down in the side of the cocoon.

Herr Graff bred *S. cimbicis*, in May, in Germany, from the *Cimbex variabilis* with *Hemiteles dispar*, *Pezomachus cursitans* and *Torymus obsoletus*, which last was hyperparasitic upon the Cryptid, and three years later he sent the cocoon from which the above had emerged to Ratzeburg, who was able to prove that examples of *C. cimbicis* were still emerging. Both sexes are recorded from *Clavellaria amerinae* and a species of *Trichiosoma*, and the female from *Cimbex variabilis*, by Tschek. Westwood (Trans. Ent. Soc. 3rd series, i. p. lxxxvii) bred it from a cocoon which had previously produced the perfect *Trichiosoma*; and Bridgman (Entom. 1878, p. 35) says four "*Cryptus migrator*" and the perfect *Trichiosoma* emerged.

3. *migrator*, Fab.

Ichneumon migrator, Fab. S. E. 334, ♀. *I. leucorhaeus*, Don. B. I. xiv. pl. 476, fig. 1, ♀. *Cryptus migrator*, Gr. I. E. ii. 592, excl. ♂ et varr. 5, 9; cf. i. Suppl. 705; Ste. Ill. M. vii. 291; Ratz. Ichn. d. Forst. i. 145; ii. 123; iii. 138; Tasch. Zeits. Ges. Nat. 1865, p. 102, (♂ part) ♀; (nec Tschek). *C. bombycis*, Boudier, Ann. Soc. Fr. 1836, p. 357 (econ.). *Spilocryptus migrator*, Thoms. O. E. v. 502 et xxi. 2366, ♂ ♀. Var. *Cryptus fumipennis*, var. 2, Gr. I. E. ii. 603, ♂. Var. brachypt, *C. brevipennis*, Desv. E.M.M. iii 190, ♀; (?) *Spilocryptus brevipennis*, Kriech. Ent. Nachr. 1893, p. 54, ♀. (?) *Pezomachus aberrans*, Grav. I. E. Suppl. 714, ♀.

Head black with cheeks sub-buccate; internal orbits white, generally obsoletely in ♀, which has the clypeus discreted, apically sub-truncate with the epistoma prominent; ♂ with a mandibular and a clypeal mark also white. Antennae of ♀ white-banded and basal flagellar joints entirely ferruginous, with the first at least thrice longer than broad. Mesonotum nitidulous and not very closely punctate; metathorax of ♀ moderately rugose, both transverse costae bisinuate and centrally obsolete, with the

apophyses normal; spiracles small and sub-circular; pronotum of ♂ white. Scutellum black, of ♂ usually white. Abdomen of ♀ broader than thorax and ovate, of ♂ narrower; red, with base of first, sometimes apex of fourth and whole of following segments black, except the last or last two, which are dorsally white; basal segment of ♀ slightly curved laterally and parallel-sided from the spiracles, dorsally flat and glabrous; post-petiole transversely sub-quadrate, of ♂ longer and of ♀ shorter than broad; thyridii transverse, second segment of ♀ closely punctate; terebra about half the length of the abdomen. Legs somewhat stout, red; all the coxae and the hind legs black, with tibiae basally white-banded; ♀ with hind femora, except apically, red. Wings somewhat clouded, discally darker in ♀; tegulae of ♂ and radix white; nervelet sub-obsolete, areolet parallel-sided; nervellus intercepted obviously below its centre. Length, 9-12 mm.

This species is very similar to the preceding, but the post-petiole is shorter; the ♀ has the cheeks sub-buccate, the clypeus more strongly and sparsely punctate, the metathorax more rugose with the apophyses a little stouter; its abdomen is shorter with the basal segment broader, centrally elevated with more distinct carinae, the terebra more shortly hastate and the hind femora stouter; the white markings of the ♂ are less extensive, its hind femora are black beneath, and the abdomen is rather broader with the post-petiole quadrate.

From the following, with which it agrees in its stout body and legs, this species may be distinguished by the ♀ hind legs having the trochanterellus and tibiae internally red, with their femora black at the apex, and the ♂ epistoma not white.

The male varies in having the scutellum and tegulae black or white or white-marked, the hind femora apically and sometimes also at the base or beneath black, and the anus with one, two or three white marks. The variety *fumipennis* has the femora entirely black, with the front knees red and the tibial white band not entire.

In 1866, Marshall thought Desvignes' variety *brevipennis* referable to *incubitor*, but in his 1872 Catalogue it is referred to the present species, because the apophyses are of normal length. The wings are only about as long as the head and thorax, and perfectly symmetrical, broad and truncate at the apex, slightly emarginate centrally, with the radial cell much shortened and widened, the costal nervure failing at and beyond the stigma; the three cubital cells are visible, the third being rudimentary; none of the nervures reach the margin, and the central fascia is interrupted by three hyaline spots, one of which is on the inner nervure of the first cubital cell. The hinder wings, with their nervures and cells, are similarly and proportionately abbreviated. This would appear to be identical with *Pezomachus aberrans*, Grav., though in a more fully developed form.¹

M. Boudier's "Observations sur les habitudes de larves d'Ichneumons vivant aux dépens de la chenille du Bombyx du chêne" are most interesting, but he fails to say more than the larvae are "molles et munies de suçoirs qui dévoieraient cette malheureuse chenille, avec ce stoïcisme que tout être vivant exerce quand il s'agit d'un sine quâ non." He bred ten males and four females from *Bombyx quercus*, but his figures of both sexes,

¹ The insect doing duty for *P. aberrans* in the National Collection is much larger than the length indicated by Gravenhorst ($1\frac{1}{2}$ lines), but is certainly referable to the present genus and identical with an example given me by Whittle, which was bred at Locarno towards the end of May, from *Psycha opacella*, H.S.

at plate viii., with details, look more like *G. titillator* than the present species, having the areolet very large and the notauli conspicuous. The larva figured has a distinct, corniform projection on either side of the head, which is foveate between them; the spiracles distinct and the lateral lobes sub-obsolete; it has thirteen segments, and the cocoon figured shows the larva skin pushed to one end and the parasite's chrysalis irregularly occupying the remainder, the imagines having emerged through two lateral holes.

This is a common British species, and has several times been bred from the above host, whence Bignell raised eleven males and only one female, and twelve males alone from *B. trifolii*; it also preys upon *B. rubi* (Buckler), *Macroglossa stellatarum*, *Cerura vinula*, and *Cimbex lucorum*, L. (Marshall), *Euchelia jacobaeae* (Entom. 1881, p. 139), *Zygaena filipendulae*, *Psyche unicolor* and *P. viciella* (Brischke); and in addition it is said to have been bred from *Lasiocampa pini*, *Dicranura bifida*, *D. erminea*, *Plusia moneta*, *Psyche atra*, *Chalicodoma muraria*, *Hylotoma rosarum*, and *Eristalis sepulchralis* (Entom. 1883, p. 36). Hope sent the female to Gravenhorst from Netley; Stephens says it was abundant about London, in June and July, as well as in Shropshire; it has been found to be common in Norfolk, at St. Issey in Cornwall, Land's End, Guestling and Hastings, Essex; and Bairstow took it in Grimescar Wood near Huddersfield, and bred it from some Geometer. I possess both sexes taken by Miss Chawner at Lyndhurst, and bred together by Routledge near Carlisle; and have swept the male, which Wilson Saunders took at Greenings, in Wicken Fen, in June.

The variety *brevipennis* is rarer than the type form. Luff has found it in Guernsey, and I possess another taken by Bloomfield at Guestling, in 1891.

4. *fumipennis*, Grav.

Cryptus fumipennis, Gr. I. E. ii. 601, excl. var. 2; Tasch. Zeits. Ges. Nat. 1865, p. 103, ♂ ♀. Var. *C. migrator*, var. 9, Gr. I. E. ii. 598; *C. fumipennis*, Tschek, Verh. z.-b. Ges. 1870, p. 133, ♂. *Spilocryptus fumipennis*, Thoms. O. E. v. 503 et xxi. 2366, ♂ ♀.

Head black, cheeks buccate; of ♂ strongly and straightly narrowed posteriorly, with palpi, a mandibular mark, clypeus, internal orbits and sometimes a bifid facial mark, white. Antennae of ♂ with scape beneath, of ♀ with central flagellar joints, white. Mesonotum nitidulous and not very closely punctate; petiolar area obsolete; spiracles small and sub-circular. Scutellum (excepting in var.) black. Abdomen black, with second, third, apex of first and, at least in ♂ which is broadest at apex of second segment, base of fourth, red; seventh dorsally white; post-petiole of ♀ sub-transverse, of ♂ elongate, only slightly explanate and convex, glabrous with apical angles obtuse, its apex red with the extreme margin white; terebra rather shorter than abdomen. Legs black; anterior with femora, tibiae and tarsi red; of ♂ with tibiae basally, and coxae and trochanters beneath, white; hind ones with femora, except at apices, red in ♀, black with extreme base white in ♂, tibiae basally white-banded and, in ♂, marks beneath the trochanters, the calcaria and central tarsal joints also white. Wings centrally a little clouded; radix and, in ♂, tegulae white, latter in ♀ black; areolet parallel-sided; nervellus intercepted obviously below centre. Length, 9-10 mm.

The male sometimes has the scape immaculate, a white dot beneath the radix, the coxae and trochanters immaculate, and the base of the anterior femora is usually black.

It is very like *S. migrator*, but a little smaller; the cheeks are buccate and the head somewhat narrowed behind the eyes, the female post-petiole is less transverse and its carinae are a little elevated, the second segment is more closely and much more finely punctate, the epistoma is less prominent, the terebra is considerably longer and its hind femora are apically more broadly, with the trochanterellus entirely black; the white coloration of the male is less profuse.

The male variety *migrator* has a dot on the scutellum, generally the post-scutellum and sometimes the pronotum anteriorly, and dots on the metathorax, white.

S. fumipennis is not uncommon throughout northern and central Europe in May and June, but it has been much overlooked in Britain, whence it was first recorded by Desvignes in 1856. Perkins bred five males and three females at Wotton-under-Edge from cocoons of *Zygaena filipendulae*, which he had collected just twelve months before (Entom. 1880, p. 69), and Bridgman from *Saturnia carpini* (l. c. 1881, p. 139); on the Continent Tschek records it from *Psyche viciella* and Laboulbène from *Zygaena laeta*. Chapman has given me both sexes, bred from Psychids at Locarno; and Miss Chawner the only British specimen I have seen, from the New Forest.

5. abbreviator, Fab.

Ichneumon abbreviator, Fab. E. S. Suppl. 222 (nec Panz.). *Pezomachus abbreviator*, Gr. I. E. ii. 878. *Agrothereutes abbreviator*, Först. Wieg. Arch. 1850, p. 81 (form typ.); Voll. Schets. i. pl. iii. fig. 17; Pinac. pl. xxxvii. fig. 3, ♀. *Cryptus tibiator*, Gr. I. E. ii. 539; Tasch. Zeits. Ges. Nat. 1865, p. 93, ♂ (form typ.). *C. pygoleucus*, Gr. I. E. ii. 540 (excl. var. 1. Suppl. 702); Ste. Ill. M. vii. 286; Tasch. Zeits. Ges. Nat. 1865, p. 103 (excl. var. 1); Voll. Pinac. pl. xli. fig. 7, ♂. *C. incubitor*, Tschek, Verh. z.-b. Ges. 1870, p. 415, ♂ (part). *Spilocryptus dispar*, Thoms. O. E. v. 504, ♂ ♀; cf. xxi. 2367 et Brisch. Schr. Nat. Danz. 1881, p. 335. Var. *C. ischioleucus*, Gr. I. E. ii. 541, ♂. Var. *Pezomachus Hopei*, Gr. I. E. i. Suppl. 715; Curt. B. E. pl. dxxvvi. *Agrothereutes Hopei*, Först. Wieg. Arch. 1850, p. 82; Voll. Pinac. pl. xxxvii. fig. 1 (details), ♀.

♂. Head triangular; clypeus elevated and discreted, apically sub-truncate; palpi, sometimes a mandibular mark and frontal orbits narrowly, white. Antennae filiform, hardly shorter than body. Thorax generally with callosity beneath radix, sometimes a dot before it and two metathoracic marks, white; mesonotum nitidulous; metathorax somewhat coarsely rugose and convex, basal transverse costa distinct, hind one only indicated by the apophyses; spiracles small and sub-circular. Scutellum entirely or apically, and post-scutellum, white; rarely black. Abdomen slender, centrally parallel-sided; black, with third and fourth segments usually entirely, and apex of second, red; the first apically, sometimes also basally, and the seventh dorsally, whitish; post-petiole deplanate and dilated, very finely punctate dorsally, slightly longer than broad, with very prominent spiracles. Legs slender, black; anterior femora, tibiae and tarsi fulvous, with apices of trochanters and base of coxae white; hind femora red, and tibiae white, towards the base; their tarsi infuscate, with apices of the joints rufescent or with the central ones white. Wings somewhat clouded; radix testaceous, tegulae white; areolet large, sub-quadrate,

very slightly convergent above ; nervellus intercepted in, or nearly in, the centre. Length, 4-8 mm.

♀. Head triangular, rugosely punctate ; clypeus elevated, sub-glabrous ; palpi and apex of mandibles rufescent. Antennae basally fulvescent, four central joints white ; post-annellus slightly longer than the following. Thorax immaculate, black ; mesonotum somewhat coarsely punctate. Scutellum red. Abdomen finely alutaceous, punctate and pubescent ; red, with segments four to six, except their apical margin, black ; seventh broadly white ; post-petiole explanate with prominent spiracles ; terebra as long as basal segment. Legs, including coxae, pale red ; hind femora apically infusate and their tibiae basally whitish. Wings rudimentary, not reaching beyond metathorax ; radix, tegulae and nervures flavescent. Length, 5-7 mm.

The variety *Hopei* differs in its darker palpi, immaculate mandibles, entirely rufo-testaceous thorax, broader antennal white band, and sometimes centrally infusate segments.¹ The male, as will be seen, is very variable, and Tschek goes so far as to describe the face, pronotum, and anterior coxae, white ; the variety *ischioleucus* has the mouth, the whole face and cheeks, the pronotum, and two metathoracic spots white, the post-petiole entirely red, the anterior coxae and trochanters and the hind trochanters beneath, as well as the base of all the tibiae, white, with the wings less distinctly clouded. *C. pygoleucus* has the pronotum white, the post-petiole glabrous and the second segment transversely sub-aciculate. The hind femora may be entirely, or red with only the apices, black.



Hopei (after Curtis).

No doubt can now remain that *C. pygoleucus* is the male of *P. abbreviator*, since Thomson took them *in cop.*, and Bridgman tells us that W. H. B. Fletcher bred this male from the same cocoon as *P. Hopei* (*cf.* Trans. Ent. Soc. 1884, p. 423), though he was not—solely on account of its greater rarity—of opinion that *P. abbreviator* was synonymous with the latter. This relationship had been anticipated by Marshall (E.M.M. ix. p. 119), who took *C. pygoleucus* and *P. Hopei* “in very close juxtaposition,” which argued affinity ; he adds that both sexes are not uncommon in the neighbourhood of St. Albans, and (*lib. cit.* viii. p. 162) records a macrop-terous form of *abbreviator*, ♀, from Corsica. In Opusc. Ichn. 511, however, Schmiedeknecht persists in separating *abbreviator* on the strength of the thoracic colour, adding “Sonst in Färbung und Sculptur der vorigen Art (*Pygoleucus-Hopei*) ähnlich.”

This species is common on the Continent on umbelliferous flowers in July. Hope sent the types of *Hopei* to Gravenhorst from Netley, together with a variety of the male having the front coxae beneath, and base and apex of the first segment, white. Bridgman records the male from Norwich in October and common throughout Norfolk, *Hopei* as also common in the same county, where it was twice taken by Curtis, and once by Bridgman at the end of October, and bred from *Eupacilia ambigua*, *Psyche viciella* and *P. intermediella*, while of *abbreviator* he found but a

¹ I can, however, find no structural difference upon which to found a distinct species, as authors have for so long been in the habit of doing. Schmiedeknecht still (1904) considers it the typical female of *S. pygoleucus*, Grav., and gives *abbreviator* as distinct, with “♂ unbekannt.”

single specimen at Mousehold in August ; and in his collection at Norwich is the pair bred together by Fletcher on April 25th, 1884. It has been found at Maldon by Fitch, Botusfleming and Lee by Marshall, near London and in Salop by Stephens, on the goat-field in the Isle of Arran by Curtis, both sexes at Land's End by Marquand, and by Chitty in Oxfordshire, Yorkshire and Charing in Kent. Capron has caught the male at Shere, W. Saunders at Greenings in Surrey, and early in August I have netted it at Hursthill in the New Forest, and on Fennel flowers at Dunwich in June. *Hopei* has been sent to me from Dover by Sladen, Ivybridge by S. Edwards, Hastings and Peppering by Esam, Stroud in June by Bradley, Scotland by Wilson ; Dale says it is rare at Glanvilles Wootton ; and I possess specimens from Greenings, Felden, Knowle (W. Ellis), New Forest in August (S. Kemp), and have taken it under sods in Wicken Fen in June, in moss at Ipswich, and in the Bentley Woods in the autumn. My typical female appears much rarer with us ; Chitty has found it near Reading, associating with *Formica sanguinea*, and Donisthorpe has sent it to me from Wicken Fen in September.

The male has been bred from *Bombyx neustria*, *Dicranura bifida*, *Psyche viciella* and *Lophyrus pini* or *similis* (Ent. 1883, p. 36) ; and the female from *Psyche fusca* and *P. viciella*. It has no connection with *Hemimachus albipennis*, as suggested by Brischke. I have seen a female, taken by Evans at Cockburnhill in Midlothian, with no white central flagellar band.

6. *adustus*, Grav.

Cryptus adustus, Gr. I. E. ii. 513, ♀ ; Tasch. Zeits. Ges. Nat. 1865, p. 94, ♂ ♀. (?) *C. opioleucus*, Gr. I. E. ii. 522, ♂. *Spilocryptus adustus*, Thoms. O. E. v. 507 et xxi. 2369, ♀. Var. *C. albolineatus*, Gr. I. E. ii. 525, ♂.

♀. Head with internal orbits narrowly white and epistoma sub-prominent ; cheeks sub-buccate ; clypeus a little convex, indistinctly discreted and apically depressed. Antennae filiform, centrally white, not tricoloured. Thorax with pronotum white ; metathorax somewhat coarsely rugose, with spiracles large and oval ; apophyses stout and sub-acute ; mesonotum somewhat closely punctate and nitidulous. Scutellum apically, and post-scutellum transversely, white. Abdomen as broad as thorax, short and ovate ; black with the four basal segments, except petiole and sides of the fourth, dark red ; sixth and seventh white-marked ; basal segment deplanate, strongly explanate and laterally curved, with not very prominent spiracles and the carinae extending to beyond its centre ; post-petiole transverse, dorsally glabrous and nitidulous, with a few deep and isolated punctures, and laterally punctate ; second and third segments shining and sub-glabrous ; terebra less than half the length of the abdomen, with its spicula obtuse and hastate. Legs black, with tibiae sub-spinulose and not white-banded ; front femora apically broadly red ; anterior tibiae dull stramineous and not inflated ; hind femora beneath, and their tibiae internally towards the base, red. Wings distinctly clouded at the apex, the disc with an infusate fascia ; nervelet short, areolet sub-quadrate ; radix and tegulae black ; nervellus nearly opposite and intercepted below the centre. Length, 8-12 mm.

♂. Head with palpi, internal orbits, and a spot on the apically sub-bidentate clypeus, white. Antennae immaculate. Thorax black with

pronotum, dots beneath the radix and two marks on the metathorax, white; apophyses weaker than those of the ♀. Scutellum apically, and sometimes the post-scutellum, white. Abdomen narrower than the thorax, parallel-sided; red, with the seventh segment, and the first except its apex black, and the anus not white-marked; basal segment narrower and more closely punctate than that of ♀. Legs black; anterior femora internally, and the hind ones except at the apex, red; anterior tibiae internally stramineous, the hind ones internally towards the base, ferrugineous; hind tarsi centrally white and the intermediate pale. Wings not clouded, radix and tegulae dull stramineous; areolet quadrate. Length, 9 mm.

I describe the sexes separately, since very great doubt appears to exist as to whether Taschenberg were justified in uniting *opisoleucus* with *adustus*; more especially is this the case, as Thomson points out, on account of the immaculate anus and so-described bidentate clypeus of the ♂, the latter being a feature which is found in no true *Cryptides*; this affinity is, however, unconditionally accepted by Schmiedeknecht.

The variety *albolineatus* differs in having the thorax and post-scutellum immaculate, the sixth segment sometimes infusate, and the hind femora entirely black.

Marshall introduced this species as British in his 1870 Catalogue, and its distribution through northern and central Europe lends probability to its occurrence, but I have heard of no captures, and seen no specimens of it. In Germany it has been bred from *Lophyrus pallidus*, *L. pini* and perhaps also from *L. similis*.

7. *nubeculatus*, Grav.

Cryptus nubeculatus, Gr. I. E. ii. 611, excl. var. 2, ♀; Ste. Ill. M. vii. 293, ♂ ♀; Ratz Ichn. d. Forst. i. 143; Tschek, Verh. z.-b. Ges. 1870, p. 408, ♀; Tasch. Zeits. Ges. Nat. 1865, p. 96, ♂. *C. grossus*, Gr. I. E. ii. 614, ♀. *Spilocryptus grossus*, Thoms. O. E. v. 508, ♀ et xxi. 2369, ♂ ♀.

Head nitidulous with grey pubescence; face of ♂ not prominent; internal orbits very narrowly pale; clypeus indistinctly discreted, sub-deplanate, apically depressed and sub-rotund; cheeks elongate; frons deplanate with an obsolete central carina and determinate scrobes. Antennae of ♂ immaculate and setaceous; of ♀ filiform with the joints short, the central ones white above and the scape sometimes rufescent beneath. Thorax shining with grey pubescence, immaculate; mesonotum finely and not closely punctate; metathorax coarsely and rugosely punctate, with coxal area distinct, nearly complete, and both transverse costae distinct; apophyses acute, weaker in ♀; spiracles large and oval. Scutellum black. Abdomen densely and finely punctate; of ♂ hardly narrower than thorax and oval, of ♀ as broad as thorax and short-ovate, becoming incrassate towards anus; red, with the petiole and four apical segments black, of which the sixth and seventh have whitish margins; fourth of ♂ sometimes entirely, generally partly, red; post-petiole glabrous and nitidulous, laterally punctate, of ♂ quadrate and isolatedly punctured, of ♀ somewhat transverse, sub-convex, apically curved and explanate laterally; terebra half the length of the abdomen. Legs black; coxae and trochanters sometimes castaneous-marked; front femora beneath, and tibiae mainly, testaceous; intermediate tibiae, especially in ♀, internally

testaceous; hind femora and generally tibiae of ♀ basally castaneous or ferruginous, not white. Wings clouded, of ♀ with a darker cloud beneath the stigma; ♂ areolet sub-quadrate and nervelet indicated; tegulae and radix black; areolet only very slightly convergent above; nervellus nearly opposite, intercepted below the centre. Length, 8-12 mm.

C. grossus appears to differ only in the shorter and more numerous antennal joints; Schmiedeknecht, however, considers it distinct on account of the sub-hyaline wings and shorter terebra. The colour and conformation of the abdomen of *grossus* is very similar to that of *S. adustus*, but the head is more strongly declived behind the eyes, the cheeks much longer and sub-compressed, the mesonotum sparsely punctate, with the scutellar foveae deep and striolate, metathorax short and basally smooth, the tibiae hardly spinulose, and the post-annellus a little longer than the scape.

The nearly complete coxal areae allies this species with *Hoplocryptus*, but the nearly rounded and mutic clypeus, short metathorax, and the conformation of the abdomen, will distinguish it; the large spiracles, distinct coxal areae and broad ♂ abdomen, resembling *Idiolispa*, will render it distinct among its congeners.

Stephens records this species as rare in June about London, and Dale as very rare at Glanvilles Wootton in Dorset. On the Continent it has been bred by van Vollenhoven from *Lophyrus catocalus*, and by Brischke from *L. pini* and *Psyche viciella*; the latter also reared it hyperparasitically from a species of *Exetastes*, which is a genus of the *Tryphoninae* (cf. Morl. E.M.M. 1903, pp. 157-164).

8. *amoenus*, Grav.

Cryptus amoenus, Gr. I. E. ii. 623; Tasch. Zeits. Ges. Nat. 1865, p. 100, ♀; Bridg. Entom. 1879, p. 55, ♂.

Head black with white palpi, clypeus strongly discreted and epistoma sub-prominent. Antennae bicoloured, centrally white in both sexes; basal flagellar joint four times longer than broad. Thorax and scutellum immaculate; metathorax coarsely rugose, with both transverse costae entire, the basal being curved and the apical centrally straight; apophyses wanting, spiracles small and ovate. Abdomen ovate, as broad as the thorax, smooth; three basal segments red, the following black; with white fasciae, obsolete or wanting in ♂, on the sixth and seventh; basal segment strongly curved laterally, dorsally flat and nitidulous, with hardly visible spiracles; post-petiole shining, canaliculate and rather longer than broad; terebra less than half the length of the abdomen. Legs somewhat slender, pale red; apices of the hind tibiae and femora black, their tarsi white with black claws; ♂ differs in having the anterior coxae and trochanters white, hind coxae black, with pale apices and the hind trochanters red with a black dorsal spot. Wings somewhat clouded; areolet sub-quadrate and nervelet wanting; radix testaceous, tegulae infuscate or red. Length, 10½ mm.

The specimens of this species in the Bridgman collection in the Norwich Museum are very similar to those of *S. cimbicis* and *G. ornatus*, but the antennae of the ♂ are centrally white-banded, and the ♀ has the

tarsi, which are red in *G. ornatus*, mainly white and, unlike *S. cimbicis*, no white band at the base of the tibiae. The discovery of the ♂ has been overlooked on the Continent; I possess one of the original specimens of this sex from Dr. Capron's collection.

This species was added to the British fauna by Bridgman (*loc. cit.*), on the strength of specimens of both sexes bred in Norfolk by Laddiman. The Continental authors appear to be in some doubt concerning its systematic position, and record it only from the vicinity of Dresden. I possess two females taken by Miss Chawner and myself in the New Forest in August, which differ from the above description in having the tibiae broadly white basally, with the basal half of the first joint and extreme bases of the following joints of the black tarsi concolorous.

GAMBRUS, Förster.

Först. Verh. z.-b. Ges. 1868, p. 188; Thoms. O. E. xxi. 2374.

Head and mesonotum dull and entirely black in both sexes; clypeus very often apically produced or spinose. Metathoracic spiracles circular. Abdomen with anus white-marked; petiolar spiracles only just behind centre; post-petiole of ♂ usually margined laterally. Tibiae with no basal white band; tarsal claws stout, not large, and shorter than second joint. Areolet large and parallel-sided; nervelet wanting; nervellus intercepted in its centre.

Thomson's three new species should, probably, also occur with us, though the sixth one of the European fauna is alpine and, with *C. leuco-proctus*, Grav., doubtfully referred to this genus, cannot be looked for here.

1. *tricolor*, Grav.

Cryptus tricolor, Gr. I. E. ii. 514, ♀; Tasch. Zeits. Ges. Nat. 1865, p. 100 (part). *Spilocryptus tricolor*, Thoms. O. E. v. 506, ♂ ♀; cf. *Gambrus tricolor*, Thoms. *lib. cit.* xxi. 2375.

Head immaculate; epistoma not prominent. Antennae of ♀ with flagellum centrally white-banded and basally rufescent, with its first joint four times longer than broad. Thorax with pronotum anteriorly red-marked in ♀, white in ♂; metathorax convex, hardly rugose, with both transverse costae present, parallel and very fine; apophyses somewhat distinct. Scutellum, and sometimes in ♀ post-scutellum, white. Abdomen red, of ♂ linear, of ♀ somewhat broad, with segments two to four dull, very finely and closely punctate; fifth and sixth segments black and the anus dorsally white; basal segment laterally hardly explanate, carinate, of ♂ sub-linear, of ♀ a little dilated apically, flat and glabrous, with the spiracles hardly projecting; terebra about half the length of the abdomen. Legs red; hind ones with apices of the femora and tibiae nigrescent; ♀ with front tibiae stramineous, inflated and basally constricted; ♂ with coxae and hind tarsi black. Wings somewhat clouded; areolet pentagonal; radix dark stramineous; tegulae red or black, of ♂ white. Length, 5-8 mm.

From *G. ornatus* this species differs in its shorter head, slightly convergent areolet; the white ♀ scutellum, red pronotal mark and front

coxae, the petiolar carinae extending beyond the spiracles, dull central segments : black ♂ hind tarsi, white-marked pronotum, narrower abdomen, and nearly linear basal segment ; and from the remainder of the Continental species in its smaller areolet, the apical white fascia on segments seven and eight of the female's abdomen ; the red ♂ femora and tibiae, of which the hind ones are not broadly black-marked, the apex of its scutellum and its anus more or less broadly, white.

This species is given in the last British catalogue as synonymous with the following, but, as I pointed out in my paper read before the Entomological Society on March 6th, 1901, it is now universally accepted as distinct, and is here so treated.

Its distribution extends throughout Europe, and it has several times been bred in Britain from *Simyra venosa* by Eedle, Harwood, Marshall and Bignell. It is probably to this species that Kaye refers (Ent. Rec. 1899, p. 235) when he writes, "The extraordinary scarcity of *Arsilonche venosa* in Wicken now, after having been so abundant in 1895, is attributable, one is inclined to think, to the parasitic hymenoptera which attack this species having got in the ascendancy. In the year quoted, when larvae were so abundant, not more than seven or eight per cent. produced moths. Since that time the species has got scarcer and scarcer, until now, when there are actual doubts as to whether the insect is going to maintain itself at Wicken." He adds that it is easy to tell if the larva be parasitized, since, in that case, it never attains the pupal condition. It has also been bred from *Poecilocampa populi*, *Trichiosoma lucorum* and a species of *Leucania*, according to Parfitt's Devon List ; and from *Plusia chrysitis*, according to Billups in the Proc. S. Lond. Soc. 1896.

2. *ornatus*, Grav.

Cryptus ornatus, Gr. I. E. ii. 620 ; Ste. Ill. M. vii. 293, ♀ ; Holmgr. Sv. Ak. Handl. 1854, p. 53 ; Tschek, Verh. z.-b. Ges. 1872, p. 249 ♂ ♀. *C. tricolor*, Tasch. Zeits. Ges. Nat. 1865, p. 100, ♀ (part). *Spilocryptus ornatus*, Thoms. O. E. v. 506, ♂ ♀ ; cf. *Gambrus ornatus*, Thoms. lib. cit. xxi. 2374.

Head immaculate ; maxillary palpi of ♂ broadly white centrally. Antennae of ♀ with flagellum centrally white-banded and basally rufescent. Thorax immaculate, narrower in ♂. Scutellum black. Abdomen red, of ♂ sub-linear, of ♀ somewhat broad, with segments four, five, and generally base of first, black ; ♂ with whole of first and part of two to four infusate ; six and seven broadly white in both sexes ; petiole gradually dilated, with no dorsal carinae ; terebra about half length of abdomen ; ventral valvulae of ♂ short vomeriform and slightly excised apically. Legs red ; front coxae and trochanters, hind ones with apices of femora and tibiae, black ; ♀ with hind tibiae also infusate before the base, or externally entirely obscure with rufescent band before base ; front tibiae not inflated ; ♂ hind tarsi with joints three and four white. Wings somewhat clouded ; radix dark stramineous, tegulae black ; areolet quite parallel-sided. Length, 7-10 mm.

This species is rendered distinct by its parallel-sided areolet, the gradually dilated petiole of the ♀ which bears no carinae, and by the structure of the ♂ ventral valvulae. Moreover, the ♀ has the head dull behind the eyes, but the cheeks nitidulous, its front coxae and trochanters

are black, and the sixth and seventh segments bear a white fascia, and the eighth a small white transverse line; the pale palpi and tarsal band of the ♂, its broader abdomen, which is widely red centrally, and the large white mark on its sixth and seventh segments, will at once distinguish it.

Bridgman (Entom. 1880, p. 52, *et* Trans. Ent. Soc. 1881, p. 154) mistook this species for *Hygrocryptus palustris*, Thoms., but later (*lib. cit.* 1882, p. 143) corrects his error.

This species, which is usually uncommon throughout Europe, is recorded by Stephens in June and July as not common about London; by Bridgman from Eaton and Brundall in Norfolk, in May and August. It has been bred from *Simyra venosa* in the middle of June, and from *Odonestis potato-ria* in Devon, by Bignell; from Bottisham Fen in 1825, Wood Ditton, and bred from *O. potato-ria* in Cambridgeshire, by Jennyns. On the Continent it is also said to have emerged from *Sesia formicaeformis* by Brischke, and *Bombyx neustria* by Vollenhoven. It appears, however, to mainly attack *Zygaenae*; Gravenhorst says it preys upon *Z. ephialtes*, L., var. *Peucedani*, Esp.; Yerbury has sent it to me from *Z. ? filipendulae* found at Parknasilla in Ireland, in the middle of July, and emerged early in August (*cf.* E.M.M. 1902, p. 54); Fred. Smith records it as having been bred from the nests of *Odynerus laevipes* in bramble stems; and I have bred several females, with *P. peregrinator*, from the cocoons of *Z. trifolii*, found in Oulton Broad, Suffolk, between the 18th and 27th July, 1898. The parasite's cocoon is quite distinct from that of the host, which usually is capable of assuming the pupal condition, though often in a distorted fashion; it is elongate, quite white and transparent, with its larva skin at the anal extremity, and occupies only the anal half of its host's cocoon. The parasitism, as far as I have been enabled to judge, is in this species solitary. I possess a male from Dr. Capron's collection, given him, probably, by Bridgman. Chitty has bred it in East Kent from *Z. filipendulae* in August, and taken it in South Wales in September; Stanley Edwards has captured females at St. Ives in Cornwall and Ivybridge in Devon, in the latter month.

HOPLOCRYPTUS, Thomson.

Thoms. O. E. v. 508.

Head with frons and external orbits immaculate; clypeus apically depressed and dentate. Antennae of ♀ white-banded. Metathorax not short; coxal area distinct and complete. Abdomen elongate, of ♀ fusiform; anus white-marked; petiolar spiracles only just behind the centre; post-petiole with distinct carinae, of ♂ usually margined laterally. Tarsal claws not stout; ♀ front tibiae inflated. Wings with areolet large and parallel-sided; nervelet wanting; nervellus intercepted above its centre.

This genus has the anus, as in *Spilocryptus*, whitemarked, but the nervelet is wanting, the post-petiole not transverse, the spiracular carinae distinct, and the spicula not hastate.

In the palaearctic fauna eighteen species are with certainty referred to this genus and nine others, including *C. subcinctus* and *C. nigripes*, are tentatively placed with them by Schmiedeknecht. All the British kinds would appear to occur but sparingly with us.

Table of Species.

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|-------|-----|--|------------------------|
| (6). | 1. | Metathoracic spiracles oval or elongate. | |
| (3). | 2. | Abdomen not distinctly red, hind femora black ; ♂ face immaculate | 1. BICINGULATUS, Grav. |
| (2). | 3. | Abdomen basally, and hind femora, red ; ♂ face white-marked. | |
| (5). | 4. | Post-petiole very dilated ; areolet emitting rectangular nervure before centre | 2. CONFECTOR, Grav. |
| (4). | 5. | Post-petiole hardly dilated ; areolet emitting rectangular nervure from centre | 3. FUGITIVUS, Grav. |
| (1). | 6. | Metathoracic spiracles small and circular. | |
| (10). | 7. | Second segment finely punctate ; femora red. | |
| (9). | 8. | Abdomen centrally red ; anus white ; face immaculate | 5. SUBCINCTUS, Grav. |
| (8). | 9. | Abdomen basally red ; anus of ♂ immaculate, its face white | 6. DUBIUS, Tasch. |
| (7). | 10. | Second segment coarsely punctate ; femora black | 4. NIGRIPES, Grav. |

1. bicingulatus, Grav.

Cryptus bicingulatus, Gr. I. E. ii. 482 ; Tasch. Zeits. Ges. Nat. 1865. p. 70, ♂ ; cf. Thoms. O. E. xxi. 2371. (?) *C. aterrimus*, Gr. I. E. ii. 472 ; Tasch. Zeits. Ges. Nat. 1865, p. 72, ♀.

♂. Slender and narrow. Head with palpi and clypeus white or latter white-marked, and discreted, deeply emarginate laterally and centrally sub-dentate ; epistoma not prominent. Antennae slender and filiform. Thorax cylindrical ; metathorax finely alutaceous, with basal transverse costa alone distinct, the apical one and the apophyses wanting. Scutellum with an apical dot or transverse line white. Abdomen half narrower than thorax, cylindrical, basal segment sub-linear, hardly explanate, sub-claviform, with no tubercles ; post-petiole slightly explanate ; apical margins of the first three segments castaneous, the seventh apically white. Legs elongate, slender ; either with coxae black, anterior trochanters white-marked, anterior femora red with their bases and two longitudinal lines black, hind ones black, tibiae stramineous with hind ones centrally ferrugineous and the black hind tarsi centrally white ; or black, with anterior femora apically stramineous, anterior tibiae testaceous and externally infuscate, and the black hind tibiae centrally, together with apex of the metatarsus, white. Wings with radix stramineous, tegulae entirely or partly white ; areolet quadrate or sub-pentagonal, and nervelet wanting. Length, 9-12 mm.

Thomson says this little known species certainly belongs to the present genus. Schmiedeknecht differentiates it from all other *Hoplocrypti* by :—Arolet emitting recurrent nervure evidently before the centre ; face entirely black, only clypeus white ; apex of scutellum and hind tarsi white ; abdomen and legs mainly black.

♀. Head black ; epistoma not prominent. Antennae with joints seven to eleven laterally white. Thorax immaculate ; metathorax with the basal transverse costa entire, slightly curved throughout and some distance from the base, the apical indistinct and low on declivity, rendering the petiolar area short ; basal area basally convergent ; apophyses small and acute,

spiracles elongate. Scutellum black. Abdomen black, with whole of the seventh and an apical dot on the sixth segment, white. Legs black; anterior with the apices of the femora, tibiae internally and apices of the tarsal joints, testaceous; intermediate tibiae darker. Wings slightly clouded; areolet quadrate, tegulae infusate, radix ferrugineous, nervelet wanting. Length, 11 mm.

That *C. aterrimus* is the female of *H. bicingulatus* was queried by Gravenhorst, and I tentatively here treat it as such, simply on account of the similarity of conformation, and more especially of the quadrate areolet, which excludes it from the genus *Cryptus* as herein restricted.

Cryptus bicingulatus was first recorded from Britain in Marshall's 1872 Catalogue, but I have heard of no actual records, and the Continental authors seem to have recently quite ignored it in their revised classifications. *C. aterrimus* is recorded as British in the 1870 Catalogue, but no more appears to be known of it. I possess a single male taken by Adams at Lyndhurst, in the New Forest, at the end of June, 1902. It is extremely probable that all previous mentions of this species as British refer to the male of *Aritranis signatorius*, since the male standing under *Cryptus bicingulatus* in Marshall's collection in the British Museum is certainly referable to the latter species.

2. confector, Grav.

Cryptus confector, Gr. I. E. ii. 518; Ste. Ill. M. vii. 284; Tasch. Zeits. Ges. Nat. 1865, p. 95. ♀; Tschek, Verh. z.-b. Ges. 1870, p. 143, ♂ ♀; cf. lib. cit. 1872, p. 246. *Hoplocryptus confector*, Thoms. O. E. xxi. 2371. *H. elegans*, Thoms. lib. cit. v. 511, excl. ♂ (cf. Bridg. Trans. Ent. Soc. 1881, p. 154). Var. *Cryptus fugitivus*, var. 3, Gr. I. E. ii. 517, ♀.

Shining and punctate, with whitish pubescence. Head sub-buccate; clypeus apically a little produced, transversely impressed and laterally deflexed; frons deplanate; ♀ with epistoma bicanaliculate; ♂ with palpi, centre of mandibles, cheeks, clypeus and face white. Antennae slender, filiform; of ♀ with central flagellar joints above, of ♂ with scape beneath, white. Thorax with metanotum convex and finely rugulose, with lateral areae complete, the petiolar broadly arcuate and finely delineated; transverse costa of ♀ sub-obsolete; spiracles oval; ♂ with pronotum and lines beneath radix white. Scutellum of ♀ with an apical dot, of ♂ as well as post-scutellum, white. Abdomen alutaceous, narrower than thorax, black; of ♀ ovate-fusiform, with three basal segments, except sometimes the petiole, red; of ♂ sub-linear, centrally red; anus white in both sexes; basal segment, at least in ♀, distinctly elongate, slightly convex, glabrous, with the petiole somewhat curved; post-petiole parallel-sided, somewhat longer than broad and apically dilated, with no carinae; ♀ with ventral segments four to six prominent and terebra as long as abdomen. Legs slender and elongate, hind tibiae of ♀ spinulose; red, with coxae and trochanters black, tarsi and hind tibiae externally, ♂ also with apices of hind femora, nigrescent; hind tarsi centrally, and in ♂ anterior trochanters and basal hind tibial band, white. Wings clouded; radix ferrugineous; tegulae infusate, of ♂ white; second recurrent emitted from far before centre of areolet; radial nervure apically inflexed; lower basal nervure interstitial. Length, 9-11 mm.

This species is very similar to *H. dubius*, but the spiracles are longer,

the post-petiole dilated, with dentately prominent spiracles; the colour of the ♂ face, legs and abdomen is the same, but the structure of the basal segment and longer metathoracic spiracles will distinguish it.

The ♀ var. *fugitivus* differs in having no hind tibial pale band, the anterior femora basally infuscate, and the second, or second and third segments, black-marked; perhaps Tschek's var., with the first segment entirely, the second at base and apex, the third apically, black, is its male.

Kriechbaumer (Ent. Nachr. 1891, p. 225) considers Thomson's species to differ from that of Gravenhorst in the colour of the femora, tarsi and in size; he himself, however, describes a variety with a semi-ovate spot on the seventh segment, and its apical membrane white, the post-petiole entirely and base of the fourth segment, red.

H. confector is said to occur very rarely throughout northern and central Europe, but the only British record I can find is Stephens' from near London, in June. Abroad it has several times been bred from a bee, *Osmia tridentata*, which nidificates in bramble stems, and from the Evaniid, *Foenus assectator*, which was probably parasitic upon the Aculeate. Tschek's original male (*loc. cit.*) was bred from this host's nests in stems of *Verbascum*.

3. *fugitivus*, Grav.

Cryptus fugitivus, Gr. I. E. ii. 515, excl. var. 3, ♀; Ste. Ill. M. vii. 284; Tasch. Zeits. Ges. Nat. 1865, p. 101, ♂ ♀. *Hoplocryptus fugitivus*, Thoms. O. E. xxi. 2372 (*nec* v. 512); Brisch. Schr. Nat. Ges. Danz. 1879, p. 336. *H. confector*, Thoms. *lib. cit.* v. 511. Var. *Cryptus gracilis*, Gr. I. E. ii. 520 *et* var. 1; Holmgr. Sv. Ak. Handl. 1854, p. 53, ♂.

Head of ♂ with internal orbits, cheeks, palpi, and the clypeus, which is in both sexes apically prominent, white. Antennae slender, of ♂ with central flagellar joints white above. Thorax with pronotum and a callosity beneath radix, white; metathorax short, somewhat coarsely rugose, with transverse costae not very distinct, the basal slightly and apical distinctly curved; apophyses very small; spiracles oval. Scutellum rarely entirely, usually more or less at apex, and generally the post-scutellum or two dots upon it, white. Abdomen of ♂ sub-linear and narrower than thorax, of ♀ oblong-ovate and as broad as thorax; black, with segments two to four entirely and apex, or sometimes in ♀ whole, of first red; seventh dorsally white in both sexes; basal segment of ♂ sub-linear, impunctate but pubescent, with apical angle obtuse, of ♀ elongate and somewhat curved laterally; post-petiole shining and carinate, moderately dilated towards apex, of ♂ elongate, of ♀ quadrate; terebra about half length of abdomen. Legs slender and elongate; red, with coxae, trochanters, hind tibiae except basally in ♀, and their tarsi, black; ♀ with anterior femora more or less broadly, and hind ones at apex, nigrescent; ♂ with anterior tarsi pale, coxae and trochanters beneath, and central joints of hind tibiae, white. Wings somewhat clouded; radix and tegulae of ♂ white, of ♀ stramineous or black; second recurrent nervure emitted from nearly in the centre of areolet; radial nervure apically inflexed. Length, 12 mm.

The legs of the ♀ are sometimes mainly black, with the anterior internally testaceous. The nervellus is often intercepted below the centre, according to Kriechbaumer (Ent. Nachr. 1891, p. 225).

From *H. confector* and *dubius* it may be known by its less cylindrical thorax and shorter notauli. From *H. confector*, which it resembles in its conformation, it is distinguished by the less strongly dilated post-petiole, with distinct carinae, the recurrent nervure emitted from nearer the centre of areolet; by the often black ♀ scutellum, its broadly black anterior femora, and the apex of the hind ones also black; and by the less profusely pale-marked ♂ head.

The ♂ var. *gracilis* has the head entirely black, the pronotum white, and the coxae with trochanters immaculate.

August and September on umbels (Gr.). Common about London in June and July; Salop (Steph.). Giraud writes: "*Le Cryptus gracilis* est parasite de chrysalides du *Smerinthus (populi)*, trouvées au pied des peupliers dans les environs de Paris."

4. *nigripes*, Grav.

Cryptus nigripes, Gr. I. E. ii. 523; Tasch. Zeits. Ges. Nat. 1865, p. 96, ♂ ♀.

Head immaculate; face coarsely punctate and not centrally prominent; clypeus coarsely punctate, centrally dentate apically, not discreted, with basal foveae distinct. Antennae of ♀ with joints somewhat short, the eighth to tenth white above; of ♂ black. Thorax immaculate; meta-thorax closely and deeply punctate; transverse costae entire in ♂, in ♀ the basal centrally obsolete and the apical inconspicuous; petiolar area basally produced in ♂ centrally; spiracles sub-circular. Scutellum apically or entirely white. Abdomen black, with segments two to four entirely, in ♂ base and margin of fifth, in ♀ apex of first, rufescent; ♀ with seventh segment dorsally white and the third to sixth ventrally prominent; petiole laterally curved, with normal tubercles and sub-obsolete carinae; post-petiole laterally straight, dorsally convex, of ♀ with deep and elongate punctures, of ♂ sub-glabrous; second segment unusually coarsely punctate; terebra longer than half abdomen. Legs black, anterior tarsi, tibiae and apices of their femora, ferrugineous; front tibiae of ♂ internally flavous; hind legs not incrassate, their tarsi immaculate. Wings a little clouded; areolet quadrate, nervelet wanting; tegulae black, radix of ♂ dark ferrugineous, of ♀ testaceous. Length, 9 mm.

No mention of this species is made in Thomson's Opuscula, or in Schmiedeknecht's paper on *Cryptus*, but in his Opus. Ichn. the latter places it doubtfully in the present genus. Taschenberg's description leads one to suppose all longitudinal metathoracic costae to be wanting, and, among the *Cryptini*, its quadrate areolet, dentate clypeus, and absent nervelet appear to place it in *Hoplocryptus*. Gravenhorst points out that the female is similar to *C. attentorius*, differing principally in the shape of the areolet.

The single female doing duty for this exclusively Italian species in the British Museum, and upon the strength of which, perhaps, Desvignes introduced it as British, is referable to *Habroeryptus brachyurus*, and appears to be from Curtis' collection. It is not, however, typical, but has the

scutellum apically pale, the head immaculate, segments two to four suddenly red, and femora black, as in *C. nigripes*; but the head is strongly transverse, the hind tarsi have the second joint whitish, and the tibiae are uniformly infusate.

I know of no further reference to this species as British, and its right to inclusion in our fauna is extremely doubtful.

5. *subcinctus*, Grav.

Cryptus subcinctus, Gr. I. E. i. Suppl. 703; Ste. Ill. M. vii. 287; Tasch. Zeits. Ges. Nat. 1865, p. 101, ♂.

Head immaculate; clypeus discreted and centrally dentate. Antennae slender, filiform and rather shorter than the body. Thorax black; metathorax coarsely rugose, with both transverse costae distinct and far apart; apophyses obsolete. Scutellum with an apical white dot. Abdomen nearly half narrower than thorax, black; third segment red, with a central infusate fascia, the seventh dorsally white-marked; basal segment somewhat broad, with sub-central tubercles; post-petiole deplanate, a little longer than broad, basally broader than the petiole, and, like the gradually dilated second segment, very finely and closely punctate. Legs slender, red; coxae, trochanters, hind tarsi and apices of their femora and tibiae, black. Wings somewhat clouded; areolet sub-quadrate, nervelet wanting; radix stramineous, tegulae nigrescent. Length, 8 mm.

The notes upon the position of the last species are also applicable to this male, which is placed by Gravenhorst between *Microcryptus leucostictus* and *Spilocryptus abbreviator*, from which he says it differs in the strongly linear basal segment, shorter and broader petiole and less convex post-petiole.

This species was described from an example taken by Hope at Netley in Shropshire. Stephens records it from about London, in 1835; and Bridgman so named a specimen taken by Marquand in the Land's End district, in 1884.

6. *dubius*, Tasch.

Cryptus dubius, Tasch. Zeits. Ges. Nat. 1865, p. 99, ♀. *Hoplocryptus dubius*, Thoms. O. E. v. 510, ♂ ♀. *Cryptus albus*, Tasch. Zeits. Ges. Nat. 1865, p. 97, ♂; cf. Brisch. Schr. Nat. Danz. 1879, p. 336.

Head black; of ♂ with clypeus centrally emarginate and epistoma deplanate; with face, a large genal and mandibular mark, and the palpi, white. Antennae of ♀ bicoloured, with the three central joints white and the basal flagellar at least four times longer than broad; of ♂ nearly as long as the body, with the scape white beneath. Thorax black; basal metathoracic transverse costa entire though fine and the apical one obsolete; spiracles small and sub-circular. Scutellum of ♂ white, of ♀ black with its apex or apical half white. Abdomen black, with the three basal segments red, the third being sometimes fuscous apically; segments five to seven of ♀ becoming gradually more broadly white; post-petiole of ♂ sub-obsolete canaliculate and sparsely punctate; second and third

segments closely and finely punctate; terebra hardly shorter than abdomen. Legs black, femora slender and not inflated, hind legs elongate; femora and anterior tibiae entirely red; hind tibiae apically infusate, basally red in ♀, white-banded in ♂; tarsi infusate, the hind pair centrally white in both sexes. Areolet emitting recurrent nervure from a little before its centre, of ♂ sub-quadrate; radial nervure apically inflexed. Length, 8-12 mm.

This species differs from *H. confector* in the basal segment not being dilated, the spiracles of the metathorax rotund and the upper wings with the ordinary transverse nervure situated before the cubital fork. The female is said to be much like that of *P. peregrinator*, but its hind femora are much longer and not incrassate, with the basal segment less glabrous and carinate. *C. albus*, which has somewhat the facies of *C. albatorius*, is considered distinct by Schmiedeknecht, but a comparison of Taschenberg's description with Thomson's male leaves little doubt that Brischke is correct in considering them synonymous.

I can find no mention of this species as British till T. Wilson bred it from rose sticks, in which it was parasitic upon the saw-fly, *Emphytus cinctus* (cf. Entom. 1883, p. 33), though it is widely distributed throughout Europe.

ARITRANIS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 187; *Hygrocryptus*, Thoms. O. E. v. (1870), 513.

Clypeus often angularly produced at apex. Thorax usually broadly red; metathorax densely tomentose; coxal areae distinct. Post-petiole bicarinate, glabrous or finely punctulate; anus white. Onychium with the pulvillus and claws stout and elongate; tibiae mutic and in ♀ inflated. Wings somewhat narrow; areolet large and parallel-sided, rarely externally incomplete.

Thomson somewhat extended Förster's genus, and authors are consequently at variance as to its correct name; but, since the former himself acknowledges this synonymy, the earlier name is here adopted, although it may be open to doubt whether *A. signatorius*, a common British species which finds no place in the last European review of this genus, should be included or raised to generic rank. Only five certified and two doubtful species are referred to this genus on the Continent.

Table of Species.

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|------|----|---|----|-------------------|
| (2). | 1. | Clypeus apically truncate; apophyses acute ... | 1. | ELEGANS, Desv. |
| (1). | 2. | Clypeus apically produced; apophyses obtuse. | | |
| (6). | 3. | Abdomen and legs mainly red; scutellum not white. | | |
| (5). | 4. | Areolet entire; mesonotum black | 2. | CARNIFEX, Grav. |
| (4). | 5. | Areolet incomplete; mesonotum red | 3. | RUFUS, Morl. |
| (3). | 6. | Abdomen and legs black; scutellum white ... | 4. | SIGNATORIUS, Fab. |

1. *elegans*, Desv.¹

Cryptus elegans, Desv. Cat. 57, ♂ ♀; cf. Bridg. Entom. 1880, p. 52 et Trans. Ent. Soc. 1881, p. 153. *Hygrocryptus Dreuxeni*, Thoms. O. E. v. 514, ♂ ♀; cf. *lib. cit.* xxi. 2376.

Head immaculate; clypeus truncate and labrum free. Antennae of ♂ dull testaceous beneath; of ♀ with scape black, five basal flagellar joints red, and the three following white. Thorax and scutellum immaculate; metanotum dull, apophyses acute; ♂ with lateral costae elevated. Abdomen elongate, pyriform; the three very dull and closely punctate basal, and base of the fourth, segments red, with the apex of the third infuscate; sixth and seventh with white fasciae; post-petiole a little broader than the petiole, which is basally toothed on either side and its lateral margins elevated; the second twice broader at apex than at base; terebra one-fourth the length of the abdomen, ♂ with valvulae prominent. Legs red, with the anterior onychii ferrugineous; ♂ with all, ♀ with front, coxae and trochanters, apices of hind femora, tibiae and tarsi black; central joints of hind tarsi white. Wings somewhat clouded; radix testaceous, stigma nigrescent. Length, 12 mm.

[I have followed Bridgman in considering Desvignes' species as synonymous with that of Thomson, in spite of what the latter says to the contrary, since the points of distinction are not apparent in the two descriptions, except that Thomson gives one to understand that the ♀ of his species alone has the tarsi white. Desvignes says *C. elegans* is closely allied to *C. amoenus*, Grav., but is much larger, and differs in the hind tarsi and terebra.

The single ♂ type of *C. elegans* in the British Museum may be further characterized as having:—The head and palpi entirely black, the face with griseous pubescence. Antennae setaceous and black, becoming only slightly ferrugineous basally beneath. Thorax and scutellum black; meta-thorax scabrous with very distinct areae, the basal area narrow, areola sub-quadrate, petiolar area only one-third high and, unlike the lateral areae, not discreted; spiracles large and shortly oval. Legs red, with apices of hind tibiae and extreme apices of their femora, black; hind tarsi black with joints three and four (except apex of latter) white. Wings somewhat narrow with the areolet sub-quadrate—as in *A. carnifex*—and the costa brunneous; hind wing with nervellus post-furcal and intercepted very slightly above its centre. I did not examine the clypeus.]

From *A. carnifex*, *Dreuxeni* may be known by the dull and black metathorax, closely punctate basal segments and elevated petiole; the ♀ terebra is shorter, the stigma nigrescent, with the areola and whole metathorax longer; and the ♂ by the colour of its legs and its elevated lateral costae.

This species was described from specimens in Curtis' and Desvignes'

¹ *Cryptus ruficeps*, Desv. Cat. 55, ♀.

Desvignes' inadequate description of this species is as follows:—Head black; frontal orbits, mouth except apices of mandibles, and the face except lateral marks, fulvous. Antennae filiform, rather longer than half the body; centrally white-banded, testaceous beneath. Thorax immaculate; metathorax nearly smooth. Abdomen red with two apical segments infuscate and anus white; post-petiole canaliculate; terebra two-thirds the length of the abdomen. Legs red with all the trochanters and posterior coxae basally infuscate; anterior femora infuscate above; tarsi dull red. Wings sub-fasciated centrally below the stigma; tegulae piceous. Length, 4½ lines.

Only a pin-hole adorns the proper position of this "species" in the British Museum, and the type appears to be lost. The coloration appears similar to that of *C. elegans*, Desv.

collections ; Bridgman has, more recently, captured it at Brundall in the Norfolk Broads, in July and October ; and there is a female in Marshall's collection (Brit. Mus.) from Bromley, taken in the middle of June, 1892. *Dreusenii* has been bred from a *Noctua* moth.

2. *carnifex*, Grav.

Cryptus carnifex, Gr. I. E. ii. 631 ; Ste. Ill. M. vii. 295 ; Tasch. Zeits. Ges. Nat. 1865, p. 105 ; Voll. Pinac. pl. xli. fig. 9, ♀. *C. varicoxis*, Tasch. Zeits. Ges. Nat. 1865, p. 97 ♂. *Hygrocryptus carnifex*, Thoms. O. E. v. 513 et xxi. 2376, ♂ ♀.

Head sub-triangular, cheeks not buccate, nor epistoma prominent ; clypeus discreted and apically denticulate in the centre ; palpi of ♂ mainly white. Antennae filiform ; of ♂ elongate, of ♀ tricoloured, with basal flagellar joints red, and the first flagellar joint four times longer than broad. Thorax not strongly shining, of ♂ mainly black ; of ♀ either black with metathorax and propleuræ red, or red with pro- and mesonotum black ; mesosternum black or with a rufescent mark behind ; metathorax closely and confluent punctate, with both transverse costae entire, the apical centrally straight ; areola of ♂ elongate and determinate ; spiracles sub-circular. Scutellum black ; of ♀ mainly, or at least laterally, red. Abdomen shining and glabrous ; red, with the four apical segments and most of the fourth black, the seventh and eighth dorsally white ; basal segment angulated, sub-explanate and curved laterally, with carinae extending from the base to beyond the sub-obsolete spiracles, which lie far behind the centre ; post-petiole dorsally deplanate, with apical angles not rounded, of ♂ parallel-sided and very finely and closely punctate ; terebra short and not more than half the length of the abdomen. Legs red ; hind tibiae and femora usually nigrescent towards their apices ; ♀ onychii stout, claws and pulvilli large ; ♂ with front coxae and trochanters black, and the hind tarsi white-banded. Wings somewhat clouded ; stigma flavescens, radix piceous, tegulae ferrugineous ; areolet large and parallel-sided, nervelet wanting ; nervellus post-furcal and intercepted in its centre. Length, 10 mm.

Both sexes vary in the extent of the red thoracic coloration.

Porritt has bred this species from reeds in Britain and, on the Continent, it is known to prey upon *Nonagria geminipuncta*, *N. paludicola*, *Leucania obsoleta* and *Senta maritima*. Stephens says it is scarce, and records it from near London, in June ; Bridgman took it at Brundall near Norwich, in July and September ; Elliott swept a fine female in Tuddenham Fen, in June, 1901. I have only met with it in the most boggy situations, always upon reeds ; Oulton Broad and Brandon, Suffolk, from the middle of May to the beginning of July. Chitty took it in the Isle of Sheppy, early in September, 1901.

3. *rufus*, sp. n.

A small, red species with incomplete areolet. Head finely and closely punctate, somewhat dull, with long and close golden pilosity ; black, with mandibles except their apices, and the palpi, red ; clypeus discreted and apically elongately unidentate ; epistoma not prominent, cheeks sub-buccate, eyes prominent. Antennae filiform, nearly as long as the body,

slender and piceous, with the basal flagellar joints apically sub-nodulose and the strongly excised scape bright red. Thorax brick-red, with mesopleurae and sternum, the scutellar region and whole metathorax, except two dots in the basal lateral areae, black; mesonotum finely scabrous and villose, with notauli extending to the deplanate disc; metathorax obsoletely reticulate, with distinct pubescence and the petiolar area longitudinally rugose; apical costa straight and entire, basal centrally inflexed towards the base before which it diverges to form the basal area; areola elongate and laterally indeterminate; spiracles small and circular. Scutellum red and obsoletely punctulate. Abdomen elongate and laterally only slightly curved; brick-red, with extreme base of petiole piceous and the three apical segments narrowly margined with clear stramineous; basal segment gradually explanate and evenly punctulate throughout, laterally bordered and dorsally carinate; the three following segments punctulate, apically sub-callose and shining; terebra about half the length of the abdomen, piceous, with spicula sanguineous. Legs red, with tibiae stramineous; front tibiae strongly inflated, hind ones apically and before the sub-incrassate centre piceous; onychii normal, infusate. Wings somewhat narrow and slightly clouded; stigma piceous, basally paler; radix and tegulae white; areolet with inner nervure oblique and the outer totally wanting, fenestrae broadly discreted; nervellus post-furcal and intercepted far below its centre. ♀. Length, $5\frac{1}{2}$ mm.

The incomplete areolet allies this species to *Hemiteles*, but its elongate form, incrassate tibiae, acuminate dentate clypeus and tomentose thorax all point to a Cryptid position and agree with this genus in which it appears, however, somewhat incongruous on account of its normal onychii and abnormal areolet.

I possess but one female, which was captured by Mr. Bignell at Oreston Quarry in Devonshire, on 1st August, 1884. Since writing the above I have seen a second female of this species in Marshall's collection (in Brit. Mus.); it was taken at Cornworthy, near Totnes, in Devonshire, and is labelled "*defectivus*, Bridg.," which name was never published.

4. *signatorius*, Fab.

Ichneumon signatorius, Fab. E. S. ii. 135; Gr. I. E. iii. 892, ♀. *I. odynericidus*, Duf.-Per. Ann. Soc. Fr. 1840, p. 45, ♀. *Cryptus signatorius*, Fab. Piez. 71, ♀. *C. bellosus*, Curt. B. E. pl. mclcxviii. ♀. *C. rufoniger*, Desv. Cat. 58, ♀.

Head narrowed behind the eyes, very finely and closely punctate, black with close white pubescence; face more strongly and confluent punctate, slightly prominent centrally, of ♂ with epistoma and facial orbits broadly white; clypeus discreted, sub-glabrous, apically produced, of ♂ entirely and of ♀ sometimes centrally white; mandibles stout with equal teeth; palpi infusate, of ♂ basally white. Antennae slender, filiform, apically obtuse; of ♀ sometimes with three central joints obsoletely white above.¹ Thorax sub-cylindrical, of ♀ deep red, with prothorax, scutellar region, and usually the mesosternum and areola black, of ♂ black, with more or

¹ Westwood has called attention (Introd. ii. 138) to the fact that the antennae of the ♀ may or may not be white-banded.

less of the metathorax apically red; pronotum broadly and a callosity beneath the radix, white; mesonotum confluent and distinctly punctate, with notauli deep, elongate and terminating in a discal depression; metathorax pubescent with no apophyses and two transverse costae; basal area elongate and entire, coxal distinct. Scutellum white and superficially punctate. Abdomen elongate-fusiform, black, of ♂ sub-linear and sometimes centrally badius, evenly and closely punctate, with white pubescence; basal segment gradually a little explanate apically, centrally coarsely punctate, with not very distinct spiracles; post-petiole distinctly margined and centrally sub-impressed; second and, in ♀, third segments transversely impressed at their apical third; the seventh entirely and the eighth dorsally white, as well as the margins of all the ventral segments during life; terebra nearly half length of abdomen, valvulae very broad, pilose and black, spicula piceous. Legs slender, entirely piceous or nigrescent, with only the distinctly though not strongly inflated front tibiae, with the apices of their femora, ochraceous; ♂ hind tarsi white-banded. Wings normal, slightly clouded apically; stigma and nervures piceous; tegulae of ♂, and sometimes ♀, white; areolet sub-parallel-sided, with the external abscissa of the radius rising from its apex; nervellus post-furcal, intercepted in its centre. Length, 8-9 mm.

The single type of *C. rufoniger* in the British Museum is nothing but a small and somewhat immature female of this species with the terebra broken, the metathorax somewhat infuscate, and the bases of the antennae and abdomen unusually pale. Desvignes' description is inadequate, as may be gathered from the fact that Thomson thought (O. E. 2371) that it might be synonymous with his *Hoplocryptus mesoxanthus*, an inference set up without hesitation by Woldstedt in the *Melanges biologiques*, 1877, p. 24.

Curtis calls this "the *Odynerus* Ichneumon," because he bred two females from bramble stalks at the end of June, 1837, from which there subsequently emerged several *Odynerus laevipes*. He says, "the *Crypti* were exceedingly vivacious, not a joint of their antennae and legs, or a segment of their abdomen being at rest, and they resisted the fumes of sulphur under a glass longer than any other insect that has come under my observation" (*loc. cit.*). Martineau has recently given me a female bred from the same host, in bramble stems at Birmingham, towards the end of June, 1897, and he has caught it at Solihull in July. It has also been bred at Norwich by Bridgman from bramble sticks, collected during the preceding winter; in Devonshire by Bignell, from the same pabulum, containing the larvae of a small wasp, which he thought was probably *Spilomena troglodytes*; and in France by Giraud, from *Osmia tridentata*. It is recorded from Maldon in Essex by Fitch; Colchester by Harwood; and Dale says one specimen of *C. rufoniger*, Grav. (*sic*), has been found at Glanvilles Wootton towards the end of September. I possess examples from Felten in Herts., taken by Piffard, and from Bury St. Edmunds by Tuck, in the middle of July; by Capron from Shere, and have myself beaten the male from white poplar trees at Foxhall near Ipswich, on the 10th August, which is the latest authenticated date of appearance. Dufour and Perris bred two females from the larvae of *Odynerus rubicola*, during the early days of April, in dried bramble stems.

IDIOLISPA, Förster.

Först. Verh. pr. Rheinl. 1868, p. 188; *Liocryptus*, Thoms. O. E. v. (1873), 489.

Head sub-triangular, vertex abruptly declived; cheeks elongate and not buccate; face broad and parallel-sided; clypeus and epistoma deplanate, the former broadly rounded apically; antennal scrobes short but distinct. Antennae filiform; post-annellus not twice longer than scape, which is excised nearly to its centre. Pronotum very short, with obsolete epomiae; mesonotum not anteriorly declived, its notauli nearly wanting; metathorax very short, obliquely truncate apically; spiracles large and oval; mesosternum very short, with its sternauli short and broad. Abdomen arcuate; basal segment elongate, deplanate, straight, with spiracles situated in the posterior third; second and third segments with hind margin sub-callose and smooth; terebra short. Tibiae mutic, front ones not inflated; calcaria elongate. Wings with radial cell short; areolet very large and parallel-sided; nervellus nearly opposite.

This genus may be distinguished from *Goniocryptus* by the entire and not interrupted epicnemial, and by the epomiae being wanting above. Only *Cryptus analis* and two Continental species are included in this genus in the last European revision, in which *C. coarctatus*, Grav., is utterly ignored and omitted.

Table of Species.

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|------|----|--|----------------------|
| (4). | 1. | Areolet parallel-sided, metathoracic spiracles oval. | |
| (3). | 2. | Apophyses wanting, anterior femora mainly red | 1. ANALIS, Grav. |
| (2). | 3. | Apophyses strong, anterior femora black..... | 2. OBFUSCATOR, Vill. |
| (1). | 4. | Arolet pentagonal, metathoracic spiracles circular | 3. COARCTATUS, Grav. |

1. analis, Grav.

Cryptus analis, Gr. I. E. ii. 560, excl. ♂; Ste. Ill. M. vii. 289; Tasch Zeits. Ges. Nat. 1865, p. 91, ♀; Tschek, Verh. z.-b. Ges. 1870, p. 126, ♂ ♀. *Liocryptus analis*, Thoms. O. E. v. 490; xxi. 2356, ♂ ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1879, p. 333, (?) Var. *C. nubeculatus*, var. 2, Gr. I. E. ii. 490; ii. 611, ♀. *Ichneumon monotonus*, Ratz. Ichn. d. Forst. i. 135; ii. 133, ♂.

Black, shining, hardly pubescent. Head immaculate; clypeus large and deplanate, apically broadly rounded and margined, and, like the face, pubescent and finely aciculate transversely; face longitudinally bicanaliculate, vertex short, occiput declived; frons flat with central carina. Antennae sub-filiform, with five central joints of ♀ white. Thorax black; metanotum very short, its lateral areae smooth in ♀ and rugulose in ♂; petiolar area vertical and sub-entire, basally broad and hardly curved; apophyses wanting, spiracles oval. Scutellum black, diffusely punctate, nearly as broad as long, flatly convex and apically rounded. Abdomen hardly convex, nitidulous, as broad as the thorax, ovate and in ♂ oblong-ovate; usually black, with segments two to four, apex of first and sometimes base of fifth, red, or rarely mainly red; basal segment flat, with its sides straight; post-petiole sub-quadrate, twice broader than petiole, gradually dilated towards apex, shining and centrally sub-canaliculate, with apical angles obtuse and in ♂ spiracles often prominent; second segment

apically thrice broader than basally, gastrocaeli distinct; terebra a little longer than petiole. Legs somewhat elongate, black; anterior femora more or less testaceous apically or rufescent with the base alone black; anterior tibiae testaceous, with apices sometimes externally infusate, the hind ones occasionally rufescent basally; tarsi infusate, of ♂ with the hind or posterior white-banded. Wings somewhat clouded; radix and tegulae black; nervelet punctiform; areolet parallel-sided and subquadrate. Length, 5-9 mm.

The variety *nubeculatus* differs in having the anus white, the femora paler, etc.

This is a very common species on the Continent, and probably also in Britain. It was taken by Stephens in Shropshire as well as in Coombe and Darenth Woods, in June; Walker records it from the Isle of Man; Bridgman found it commonly in Norfolk, and Bignell at Bickleigh towards the beginning of August; and it is recorded from the Land's End district by Marquand; the Devil's Ditch near Newmarket, at the end of June (in coll. Cambs. Mus.); and from Maldon in Essex by Fitch. Piffard has caught it at Felden in Herts.; Martineau at Lyndhurst, in June; and Col. Yerbury at Waterville in Ireland, in the same month. Early in May, 1896, I secured a female at the Abbots' Wood, Polegate in Sussex. It has been bred on the Continent from *Liparis salicis* by Ratzeburg, and from *Saperda populnea* by Giraud. Chitty has taken it at Deal and Huntingfield in Kent, and in May at Loch Awe. I possess females from Mablethorpe in Lincs. (Thornley); Kingsdown in Kent (Sladen); New Forest (Chawner); Guestling in Sussex (Bloomfield); and Ryde, in August.

2. *obfuscator*, Vill.

Ichneumon obfuscator, Vill. Linn. Ent. iii. 197. *Cryptus obfuscator*, Gr. I. E. ii. 569; Ste. Ill. M. vii. 290; Tasch. Zeits. Ges. Nat. 1865, p. 80, ♀; cf. Thoms. O. F. xxi. 2356.

Head and the slender antennae immaculate; epistoma not prominent. Thorax gibbous and black; metathorax very short; petiolar area nearly vertical and coarsely rugose, obsoletely separated from the strongly rugose metanotum; basal area smoother; apophyses strong and vertical. Scutellum black. Abdomen black with second, third and apex of first segment testaceous-red; petiole elongate; post-petiole short, laterally straight and explanate, dorsally canaliculate; terebra one fourth the length of the abdomen. Legs black with front tibiae and their tarsi rufescent. Wings clouded; areolet sub-quadrate, nervelet short; radix and tegulae black. Length, 11 mm.

Gravenhorst says the size and outline are similar to those of *I. analis*, but that the antennae are more slender and the terebra is longer; Thomson adds that *C. obfuscator* probably belongs to this genus, though its inclusion therein must at present be regarded as tentative, since very little appears to be known of this species, which has dropped out of recent Continental catalogues, and it is quite possible that Stephens was wrong in recording it as having been rarely taken near London; it is, however, also mentioned from Holgate in Yorkshire by Wilson, and from the Hastings district in the Nat. Hist. Hastings. I believe Chitty took this species in the New Forest in June, 1893.

3. *coarctatus*, Grav.

Cryptus coarctatus, Gr. I. E. ii. 571; Tasch. Zeits. Ges. Nat. 1865, p. 94, ♂.

Head black, palpi whitish; clypeus discreted and apically truncate. Thorax immaculate; metathorax short with no longitudinal costae; petiolar area large and elongate, discreted, with its central area nitidulous and broadest basally, rugose apically, its lateral areae short, narrow and transversely rugose; spiracles small and circular. Scutellum black. Abdomen nearly glabrous, black, with segments two, three and base of fourth, red; anus immaculate; basal segment strongly elongate, claviform and sub-caniculate, with no tubercles. Legs black; the anterior with tarsi, tibiae and femora, except basally, red; intermediate tarsi infusate; hind calcaria white. Wings hyaline; areolet pentagonal, externally sub-pellucid; nervelet short; stigma and costa black, radix and tegulae stramineous. Length, 9 mm.

The position of this ♂ has not been determined; Gravenhorst says it is similar to *P. peregrinator*, with shorter legs and less pentagonal areolet. The short metathorax and elongate petiolar area appear to place it in either this genus or the next, though the circular spiracles and pentagonal areolet agree ill therewith; the length of the petiolar area appears to exclude it from *Pycnocyptus*.

The only British record of this unsatisfactory species is from the Land's End by Marquand; the specimen was named by Bridgman and is in Luff's collection.

GONIOCRYPTUS, Thomson.

Thoms. O. E. v. (1873), 490; *Trychosis*, Först. Verh. pr. Rheinl. 1868, p. 187 (part).

Head sub-triangular, vertex abruptly declived behind ocelli; cheeks somewhat elongate, scrobes well defined, epistoma deplanate; clypeus apically broadly rounded and mutic. Antennae elongate, apically attenuate; of ♀ sub-spiral. Pronotum very short; epomiaae angulated and reaching mesonotum, which is not declived in front; notauli nearly wanting; metathorax very short and convex, with pleural costae not reaching base and terminating far behind the spiracles; apophyses sub-obsolete; central mesosternal sulcus carinately elevated behind, the lateral ones short, broad and indeterminate; epicnemial abbreviated above. Scutellum convex and abruptly declived apically. Abdomen sub-compresso-fusiform, with the first segment elongate, deplanate and gradually dilated towards the apex; post-petiole not transverse and hardly deflexed; second and third segments with spiracles behind the centre and some distance from the lateral margin; terebra shorter than petiole, its spicula obsoletely spinulose. Legs not very stout; tibiae nearly mutic, front ones not dilated; calcaria elongate. Wings with radial cell short, areolet very large and parallel-sided; discoidal cell twice broader at apex than at base; lower wings with nervellus intercepted in or above the centre and the posterior nervure defined nearly to the outer margin.

This genus has received considerable attention on the Continent from Thomson and Tschek since the publication of the last British Catalogue.

There has, however, resulted but one addition to our fauna from the twenty species there recently described.

Table of Species.

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|------|----|--|-----------------------------|
| (2). | 1. | Metathoracic spiracles sub-linear; clypeus deplanate | 1. TITILLATOR, <i>Linn.</i> |
| (1). | 2. | Metathoracic spiracles oblong; clypeus convex | 2. PLEBEJUS, <i>Tschek.</i> |

1. titillator, *Linn.*

Ichneumon titillator, Linn. F. S. n. 1611; Müll. Prodr. n. 1812, ♀. *Cryptus titillator*, Fab. Piez. 86; Gr. I. E. ii. 564 et i. Suppl. 705 (excl. ♂); Ste. Ill. M. vii. 289; Fonsc. Ann. Soc. Fr. 1850, p. 379; Ratz. Ichn. d. Forst. iii. 139, ♀; Holmgr. Sv. Ak. Handl. 1854, p. 53; Tsch. Zeits. Ges. Nat. 1865, p. 80; Voll. Pinac. pl. vi. f. 9, ♂ ♀. *C. ambiguus*, Tschek, Verh. z.-b. Ges. 1870, pp. 145 et 419, ♂ ♀. (?) *C. analis*, Gr. I. E. ii. 560, excl. ♀. *Goniocryptus titillator*, Thoms. O. E. v. 493 et xxi. 2358, ♂ ♀.

Somewhat shining, rugosely punctate, with fuscous pilosity. Head coarsely punctate and pilose, black; face flat and uniformly alutaceous; clypeus deflexed, incompletely discreted and apically slightly rounded, with a central impression; ♂ palpi white. Antennae black, slender, as long as body, with the lower flagellar joints sub-discreted and apically tumidulous; of ♂ with first flagellar joint about thrice longer than broad; of ♀ centrally white-banded and a little incrassate before the apex. Thorax coarsely punctate and pilose; metanotum more coarsely punctate in ♂, its lateral areae incomplete; the petiolar entire, broad, sub-vertical and longitudinally strigose, with, in ♀, its basal margin sub-obsolete; basal area of ♂ smooth; spiracles linear, broader in ♂. Scutellum black. Abdomen narrower than thorax, elongate-ovate and in ♂ sub-linear; castaneous-red, with first segment or only petiole, apical half of fourth, and whole of the remainder, black; post-petiole glabrous, somewhat convex, a little longer than broad, with no foveae nor furrow, and sides straight to close to apex and spiracles prominent; terebra one-third the length of the abdomen. Legs black; anterior tibiae and tarsi, apex of front femora and base of hind ones, usually testaceous; hind tarsi of ♂ with apex of first and whole of second to fourth joints white, of ♀ with third and fourth apically dull white; the ♂ anterior trochanters also sometimes white-marked. Wings a little clouded; radix and tegulae infusate; radius apically reflexed, nervelet elongate, areolet sub-quadrate; nervellus intercepted slightly below the centre. Length, 9–12 mm.

Marshall says Gravenhorst's description does not apply to the Linnaean type, and Thomson that his female is distinct from that of Gravenhorst, who seems to have described more than one species under this name; but if this be so, the discrepancies are so trivial—the colour of the third segment and slightly paler anterior legs—as to be quite inconsiderable.

Bouché gives us a somewhat meagre description of the larva and cocoon of this species (Naturg. 142). The former is cylindrical and curved, with inflated lateral margins, it is white and acuminate with isolated bristles; the rounded head bears two short, turbinate antennae, and the dorsal segments are rather humped, with the last one narrowed; its length is two lines. He adds that it preys upon the larvae of *Botys sambucalis*; that

after the host's pupation it evacuates its pupa and spins for itself an elliptic, yellow, papyraceous cocoon, from which the imago emerges in April.

This common Continental species is certainly abundant in Britain. Tugwell has bred it here from *Lasiocampa quercus*; Tschek in Austria, from a spider's nest; Taschenberg from *Zygaena coronillae*; and it is said (Deut. Ent. Zeit. xxi. p. 286) to be hyperparasitic upon *Campoplex fugillator*, which is one of the *Ophioninae*. It occurs in June, July and August upon umbelliferous flowers, and was found by Hope at Netley (Gravenhorst); not very rarely in Shropshire and the vicinity of London (Stephens); Isle of Man (Walker); Great Wilbraham near Cambridge, in July (Cambs. Mus.); Essex (Harwood); Hastings District (Hast. List); New Forest, in July (Chitty); Eaton, in June (Bridgman); Bickleigh, early in August (Bignell); Land's End (Marquand). I possess specimens from the New Forest, in August; Nairn; Glengariff, Waterville and Kennan in Ireland. Piffard has found it at Felden; Adams at Lyndhurst; and I have taken males, in May and June, in Tuddenham Fen and the Bentley Woods, where they were attracted to the flowers of the blue wild hyacinths.

2. *plebejus*, Tschek.

Cryptus plebejus, Tschek, Verh. z.-b. Ges. 1870, pp. 147 et 420, ♂ ♀. *Goniocryptus clypearis*, Thoms. O. E. v. 494 et xxi. 2359, ♂ ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1879, p. 333.

Slightly shining, closely and somewhat rugosely punctate with grey pubescence. Head dull, black, obliquely narrowed behind the eyes; clypeus small, nearly as long as broad and slightly rounded apically; cheeks elongate, frons finely carinate centrally. Antennae slender, shorter than body, flagellum a little incrassate before the apex; of ♀ usually centrally white-banded. Thorax dull, black; mesonotum roughly punctate; lateral metathoracic areae incomplete and internally sparsely punctulate; petiolar area entire, centrally longitudinally impressed; spiracles elongate. Scutellum black. Abdomen oblong or oblong-ovate, closely and finely punctulate, especially at the sides; black with four basal segments, except the petiole, red, ♀ anus with white membrane; post-petiole sub-convex, longer than broad, laterally straight and sub-parallel, apically rounded, of ♀ with three weak foveae, of ♂ with the spiracles small and only slightly prominent; terebra one-third the length of the abdomen. Legs black with anterior tibiae and apices of their femora red; ♂ with hind tarsi more or less distinctly white. Wings clouded in ♀; radius only slightly reflexed apically, metacarpus strong to near the apex of the wing; tegulae black, stigma and radix piceous, latter pale in ♂; nervellus intercepted in or barely above its centre. Length, 8-10 mm.

Tschek shows that the colour of this species varies in certain directions; the male may have the fourth segment, which is normally red, apically margined, or with the apical half black, with the hind tarsi entirely black, or with joints three and four, or the fourth alone, white; the female may have the antennae white-spotted, the basal segment red with its base and sometimes also its apex black, with which the fourth segment may be narrowly black, apically or entirely, except its extreme base, black; or with the antennae black throughout.

He adds that the strongly and straightly narrowed head, length of cheeks, prominent eyes and elongate clypeus differ from all other *Cryptini*: the eyes hardly reach the base of the clypeus, while in *G. titillator* their apices are level with its base and the cheeks are distinctly more buccate.

This species is, indeed, very similar to *G. titillator*, but its size is generally smaller and the pilosity much less dense, the metathoracic spiracles are oblong, the clypeus sub convex, the fourth segment entirely and the first from before its centre red; the flagellar band may or may not be present; the intermediate femora are apically red and the ♂ hind tarsi are usually immaculate.

I possess examples of this species, which occurs throughout Europe, captured by Sladen, at St. Margaret's Bay in August, and by Colonel Yerbury, at Llanbedr in Wales, and Waterville in Ireland in July. Bradley has sent it me from the Birmingham district, Davis from St. Issey in Cornwall, and Beaumont has captured it at Plumstead.

CRYPTUS, *Fabricius*.

Fab. Piez. 70 (1804); Thoms. O. E. v. 475.

Head with vertex declived behind ocelli; cheeks somewhat elongate, not or hardly buccate, genal costa joining the oral a little behind base of mandibles; frons more or less excavate, clypeus apically mutic and broadly rounded; mandibles somewhat narrow, with teeth of equal length. Antennae very thin, especially in ♀; scape compressed-ovate, excised below centre, shorter than post-annellus; flagellum of ♀ setaceous or filiform, spiral and usually white-banded, of ♂ setaceous and black throughout. Pronotum short; epomiaae more or less distinct; notauli extending to nearly beyond centre of mesonotum; mesosternum with lateral sulci distinct and deep, extending at least to centre; metathorax with transverse carinae approximating, petiolar area reaching beyond the centre; apophyses distinct; spiracles linear, oval or very rarely rotund-oval. Abdomen fusiform, of ♂ nearly linear, very finely alutaceous; basal segment dilated and deflexed apically, its spiracles far behind centre and dorsal carinae distinct; second segment with epipleurae obsolete spiracles behind centre and some distance from lateral margin, thyridii small and remote from base; anus never white-marked; terebra straight and long, though shorter than abdomen. Legs not stout; tibiae often spinulose; ♂ with hind tarsi usually white-banded. Upper wings with radial cell long, its nervure apically inflexed; nervelet nearly always distinct; areola of normal size, with its sides always convergent above; internal cubital basally parallel with the upper basal nervure, its fenestra not elongate but remote from areolet; discoidal cell rectangular apically below, its external fenestrae large and extending beyond centre of recurrent nervure. Lower wing with nervellus intercepted below, or almost in, centre.

Of the fifty-four palaearctic species of this genus enumerated by Schmiedeknecht in 1904, only fifteen have at present been noticed in Britain and, even of these, three appear to rest upon somewhat doubtful authenticity.

Table of Species.

(12).	1.	Abdomen black or cyaneous, not red.	
(3).	2.	Head, thorax and petiole with black pubescence; abdomen cyaneous ...	1. CYANATOR, <i>Grav.</i>
(2).	3.	Head, thorax and petiole with no, or pale, pubescence; abdomen black.	
(9).	4.	Scrobes large, nearly reaching ocelli; scutellum rarely white.	
(6).	5.	Antennae pale-marked; ♂ face centrally pale.....	2. SPIRALIS, <i>Fourc.</i>
(5).	6.	Antennae immaculate; ♂ face centrally not pale.	
(8).	7.	Apophyses acute; hind tarsi infuscate	3. MOSCHATOR, <i>Fab.</i>
(7).	8.	Apophyses obtuse; hind tarsi red.....	4. TARSOLEUCUS, <i>Schr.</i>
(4).	9.	Scrobes small and distinctly separated; scutellum usually white.	
(11).	10.	Hind tibiae not spinulose; size larger	5. LUGUBRIS, <i>Grav.</i>
(10).	11.	Hind tibiae spinulose; size smaller ...	6. VIDUATORIUS, <i>Fab.</i>
(1).	12.	Abdomen broadly red, at least centrally.	
(14).	13.	First recurrent intercepted slightly below centre; coxae castaneous	7. SPONSOR, <i>Fab.</i>
(13).	14.	First recurrent intercepted far below the centre; coxae black.	
(26).	15.	Metathoracic spiracles linear or elongate.	
(17).	16.	Hind femora entirely red.....	8. APPARITORIUS, <i>Vill.</i>
(16).	17.	Hind femora partly black.	
(19).	18.	Dentiparal areae apically foveate	9. ATTENTORIUS, <i>Schäf.</i>
(18).	19.	Dentiparal areae normal.	
(21).	20.	Frons smooth and shining; cheeks sub-buccate.	
(22).	21.	Lateral costae apically trans-strigose; ♂ scutellum black	10. OBSCURUS, <i>Grav.</i>
(21).	22.	Lateral costae apically distinct; ♂ scutellum white	11. ALBATORIUS, <i>Vill.</i>
(20).	23.	Frons sub-rugose and dull; cheeks normal.	
(25).	24.	Apophyses small; petiolar carinae inconspicuous	12. DIANAE, <i>Grav.</i>
(24).	25.	Apophyses large; petiolar carinae distinct	13. ARMATORIUS, <i>Fab.</i>
(15).	26.	Metathoracic spiracles ovate or sub-circular.	
(28).	27.	Frons finely sculptured; scutellum immaculate	14. MINATOR, <i>Grav.</i>
(27).	28.	Frons sub-rugose; scutellum apically white	15. TUBERCULATUS, <i>Grav.</i>

A Table of the Females.

(12).	1.	Abdomen not broadly red centrally.	
(3).	2.	Abdomen blue with long black pubescence. 14-17 mm.	1. CYANATOR.
(2).	3.	Abdomen black with normal pubescence.	
(5).	4.	Scutellum white. 8-10 mm.....	6. VIDUATORIUS.
(4).	5.	Scutellum black.	
(9).	6.	Antennae white-banded; metathoracic spiracles oblong.	

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| (8). | 7. | Hind tibiae apically black ; terebra length of abdomen. 10-14 mm. | 2. SPIRALIS. |
| (7). | 8. | Hind tibiae red ; terebra shorter than abdomen. 12 mm. | 5. LUGUBRIS. |
| (6). | 9. | Antennae immaculate ; metathoracic spiracles sub-linear. | |
| (11). | 10. | Hind tarsi and tibiae not black-marked. 14-16 mm. | 4. TARSOLEUCUS. |
| (10). | 11. | Hind tarsi and tibiae mainly black. 10 mm. | 3. MOSCHATOR. |
| (1). | 12. | Abdomen partly red. | |
| (14). | 13. | Front tarsi unusually dilated (MERINGOPUS, Först.). 16-17 mm. | 10. OBSCURUS. |
| (13). | 14. | Tarsi normal. | |
| (30). | 15. | Anus and often petiole red. | |
| (17). | 16. | Epistomium not or hardly gibbous. 14 mm. | 9. ATTENTORIUS. |
| (16). | 17. | Epistomium distinctly gibbous. | |
| (21). | 18. | Antennae not white-banded. | |
| (20). | 19. | Frons excavate ; lateral metanotal areae rugulose. 11-14 mm. | 11. ALBATORIUS. |
| (19). | 20. | Frons slightly impressed ; metapleurae smooth. 7-9 mm. | Var. <i>difficilis</i> . |
| (18). | 21. | Antennae white-banded. | |
| (23). | 22. | Hind coxae castaneous. 10-12 mm. | 7. SPONSOR. |
| (22). | 23. | Hind coxae entirely black. | |
| (25). | 24. | Apophyses strong and compressed ; all femora basally black. 9-10 mm. | 13. ARMATORIUS. |
| (24). | 25. | Apophyses short or wanting. | |
| (29). | 26. | Scutellum white-marked, orbits and pronotum white. | |
| (28). | 27. | Terebra hardly longer than petiole ; tegulae white. 6-8 mm. | 15. TUBERCULATUS. |
| (27). | 28. | Terebra distinctly longer than petiole ; tegulae black. 10 mm. | 8. APPARITORIUS. |
| (26). | 29. | Scutellum, orbits and pronotum black. 9-12 mm. | 12. DIANAE. |
| (15). | 30. | Anus and scutellum immaculate. 6 mm. | 14. MINATOR. |

1. cyanator, Grav.

Cryptus cyanator. Gr. I. E. ii. 442 (? excl. var.) ; Ste. Ill. M. vii. 276 ; Ratz. Ichn. d. Forst. i. 139 ; Fonsc. Ann. Soc. Fr. 1850, p. 363 ; Holmgr. Sv. Ak. Handl. 1854, p. 50 ; Tasch. Zeits. Ges. Nat. 1865, p. 72 ; Voll. Pinac. pl. vi. f. 2 (details), ♂ ♀ ; Thoms. O. E. v. 477, ♀ ; xix. 2115 et xxi. 2349, ♂. Var. *C. seticornis*, Ratz. Ichn. d. Forst. i. 141, pl. vi. f. 10, ♀.

Head immaculate, with black hairs ; epistoma distinct and prominent. Antennae filiform ; of ♀ slender, setaceous and black throughout. Thorax with black hairs, of ♀ sometimes with a red dot beneath radix ; mesonotum coarsely and diffusely punctate ; metathorax scabrous, with front costa centrally obsolete, hind one distinct ; areola of ♂ wrinkled ; spiracles inconspicuous, linear, near base of metathorax ; apophyses small. Scutellum black. Abdomen blue-black and very finely punctate, of ♂ parallel-sided and narrower than thorax, of ♀ ovate ; basal segment shining and sub-glabrous, petiole with black pubescence ; post-petiole convex, canaliculate and sub-transverse, though narrower in ♂ which has prominent spiracles ; terebra black and about half length of abdomen, with its spicula sub-mutic. Legs sub-elongate, dark red ; the trochanters and pubescent coxae black, hind tarsi infusate ; front tibiae not inflated,

hind ones especially in ♀ nigrescent towards the apex, intermediate of ♂ also apically infusate; hind tarsi of ♂ black, compressed. Wings clouded; radix and tegulae dark, stigma black, nervelet distinct; nervellus intercepted far below centre. Length, 12-14 mm.

The variety *seticornis* has the metathorax more closely and finely punctate, with both costae distinct throughout, the abdomen mainly red-brown, the orbits white-marked and the wings less deeply clouded.

Stephens tells us that it used to be found not uncommonly about London, at Ripley and Hertford, and that its larvae prey upon those of *Phragmatobia fuliginosa* and *Clisiocampa neustria*; from both these Bombyces it has been bred in Germany as well as from *Diloba caeruleocephala*, and Ratzeburg raised the var. *seticornis* from *Trachea piniperda*; Laboulbène records it from a species of *Eumenes* in France. Although it occurs throughout Europe, the only recent British record I can find is Harwood's from Essex in the Victoria History of that county.

2. *spiralis*, Fourc.

Ichneumon spiralis, Fourc. E. P. ii. 407, ♀. *Cryptus spiralis*, Gr. I. E. ii. 454; Ste. Ill. M. vii. 278, excl. ♂; Tasch. Zeits. Ges. Nat. 1865, p. 71, ♂ ♀; cf. Tschek, Verh. z.-b. Ges. 1872, p. 237, ♂. *C. inconspicuus*, Gr. I. E. ii. 447, ♂.

Head black; of ♀ with epistoma prominent, internal orbits and generally the external very narrowly white; of ♂ with mouth, the discreted and apically truncate clypeus, most of the face, the internal and sometimes the outer and a dot at the vertical orbits, white. Antennae of ♀ filiform, with four central joints white, of ♂ with scape white beneath. Thorax somewhat shining, of ♂ with white pubescence; callosity beneath radix usually, and in ♂ the pronotum, pale; metathorax finely rugose, discally longitudinally sub-strigose, with the basal transverse costa centrally obsolete and the apical straight, lateral areae not smoother basally; apophyses distinct and smaller in ♂, which has the petiolar area sub-vertical; spiracles elongate and somewhat broad. Scutellum black; of ♂ usually, of ♀ rarely, white at apex. Abdomen black and not dull; of ♀ rather narrower than thorax and oblong-ovate, with the basal segment superficially canaliculate and slightly explanate apically, post-petiole sub-quadrate and twice broader than petiole; of ♂ narrower, with the basal segment sub-linear and centrally glabrous, with normally prominent spiracles; terebra nearly as long as abdomen. Legs slender and red; coxae and trochanters black, anterior of ♂ white-marked; posterior tarsi, apices of hind tibiae, and in ♂ of hind femora, infusate; hind tarsi of ♂ distinctly white centrally. Wings not fasciated; tegulae of ♂ white, of ♀ infusate, with radix sometimes paler; nervelet distinct. Length, 10-14 mm.

The female is said by Taschenberg and Tschek to possess a minute apical scutellar dot; and the latter tells us (*loc. cit.*) that all his Austrian males were similarly marked.

From *C. viduatorius*, the male may be easily distinguished by its much longer petiolar area.

[At Ent. Nachr. 1891, p. 226, we are told that the ♂ of Gravenhorst's *C. spiralis* (which constitutes *C. dentatus*, Tasch., and is there instanced

as synonymous with *Macrocryptus landifer*) has been bred from the nests of bees or wasps, or the burrows of the longicorn beetle, *Agapanthia cardui*, in *Eupatorium* stems. Marshall has taken what he calls *C. dentatus*, Tasch., at Botusfleming in Cornwall.]

It occurs throughout the Continent, where it has been bred by Siebold from *Talaeoporia pseudobombycella*. In Britain it is probably uncommon, and I have seen nothing quite like it. Taken near London towards the end of June, but rarely (Stephens); captured in August, near Lydford (Parfitt's Devon List).

3. *moschator*, Fab.

Ichneumon moschator, Fab. M. I. i. 266, var. *antennis totis nigris* (nec Vill.); Piez. 67. ♂. *Cryptus moschator*, Gr. I. E. ii. 451; Ste. Ill. M. 277; Tasch. Zeits. Ges. Nat. 1865, p. 72; Voll. Pinac. pl. vi. f. 4; Thoms. O. E. v. 478, ♂ ♀; cf. *lib. cit.* xxi. 2349.

Head without black hairs, palpi infusate; ♂ with clypeus discreted, centrally tuberculate and apically truncate, its internal orbits more or less narrowly, ♀ with dots at the vertical orbits, white. Antennae of ♂ apically sub-setaceous, of ♀ much more slender, filiform. Thorax with no black hairs, immaculate; metathorax rugose, ♀ with basal costa bisinuate and the apical centrally obsolete; ♂ with petiolar area small and only centrally strigose; apophyses acute, of ♂ very stout; spiracles short and oval. Scutellum black. Abdomen black, not or hardly sub-caeruleous, rather narrower than thorax; basal segment of ♀ laterally curved, of ♂ slender and glabrous; post-petiole longer than broad and sub-canaliculate; terebra shorter than abdomen. Legs elongate and slender; the anterior red, with coxae and trochanters black, and tibiae not inflated; hind ones black, with femora and more or less of the ♀ tibiae red; hind tarsi of ♂ centrally white. Wings clouded; nervelet punctiform, areolet convergent above; tegulae black, stigma infusate and in ♀ sometimes ferrugineous. Length, 10 mm.

Taschenberg's remark that the anterior transverse costa is entire appears to be inaccurate.

This species may be known by its black body, which is not hirsute, the hardly caeruleous abdomen of which the second segment is apically castaneous-margined, the narrow petiole with its almost wanting dorsal carinae, the nearly filiform ♀ antennae and by the length of the terebra.

Gravenhorst mentions a large variety of the ♂ with the inner and part of the outer orbits narrowly white and an apical white dot upon the scutellum.

Bridgman says this is a common species in Norfolk, and adds that it has been bred by Fletcher from *Acronycta myricae*: Stephens found it about London, in June, and in Salop; Francis Walker took it in the Isle of Man; Harwood in Essex; Parfitt rarely in Devonshire, in July; and there is one male in Dr. Capron's collection, probably from Surrey. It occurs on flowers of *Pastinacea*, etc., throughout the Continent, in May and July; and in his Mantissa, Fabricius notes it as "*moschum spirans*." Chitty has recently taken it at Monks' Wood in Huntingdon.

4. *tarsoleucus*, *Schr.*

Ichneumon tarsoleucus, Schr. En. no. 725, ♂. *Cryptus tarsoleucus*, Gr. I. E. ii. 447 et i. Suppl. 698; Ste. Ill. M. vii. 277, ♂ ♀; Ratz. Ichn. d. Forst. iii. 135, ♀; Tasch. Zeits. Ges. Nat. 1865, p. 71; Thoms. O. E. v. 479 et xxi. 2350; Voll. Pinac. pl. vi. f. 3, ♂ ♀.

Head black, scrobes large, extending nearly to ocelli; of ♂ with palpi ferruginous, facial orbits with centre of mandibles broadly, a transverse line on clypeus, and rarely the external orbits, stramineous; of ♀ with the internal orbits obsoletely whitish and the epistoma prominent. Antennae of ♀ slender and filiform, of ♂ setaceous and much stouter. Thorax of ♂ rarely with a flavidous callosity beneath the radix, the apophyses normal and spiracles distinct; ♀ with basal area entire and basally convergent, and with both the metathoracic costae entire and angular; the basal costa of the ♂ is sub-obsolete and the apical less angular. Scutellum black. Abdomen black, of ♂ sometimes slightly caerulescent or with the apical margin of the second segment castaneous; basal segment of ♀ laterally curved, superficially canaliculate, with weak spiracles; post-petiole sub-quadrate; terebra not reflexed and a little shorter than the abdomen. Legs red, coxae and trochanters black; front trochanters and coxae of ♂ sometimes white-marked beneath; both sexes with hind tarsi centrally fulvous or white and hind tibiae of ♂ often apically nigrescent. Wings darker in ♀; tegulae black, rarely white-marked or entirely dull white; nervelet of ♀ elongate. Length, 12-14 mm.

Both sexes of this species may be known by the coloration of the legs and the deeply impressed frons between the scrobes. From *C. curvicauda*, Thoms., which is by no means unlikely to occur in Britain, the ♀ differs in the less distinctly white-marked orbits and vertical dot, its shorter post-petiole, more strongly nitidulous metathorax and straight terebra.

This is by no means an uncommon species in May and early June, and may sometimes be beaten from whitethorn flowers. It is also said to occur upon umbels; it is to be met with throughout the summer, and I have found it in the New Forest as late as August. Stoke near Bristol (Charbonnier); Knowle near Birmingham (Ellis); Lyndhurst (Chawner); Brockenhurst (Cross); Guestling near Hastings (Bloomfield); Tostock in Suffolk (Tuck); Kinghorn near Edinburgh, in May (Evans); Bloxworth, in July (Richardson); Sunningdale, in June (Morice); Essex (Harwood); Hastings (Hast. List.); Streatham and Norbury (Brunnetti). I have taken it at Copdock and Sudbury in Suffolk, Wicken Fen and Mousehold Heath near Norwich. I associate this species with *Salix fuscus* because they are often found at the same time and place. Stephens, who records it as not uncommon about London, especially Birch Wood and Ripley in June, bred it from *Noctuae*; and it has been bred from *Trachea piniperda* and *Ammophila sabulosa* by Panzer and Siebold, though its wide range argues much commoner hosts.

5. *lugubris*, *Grav.*

Cryptus lugubris, Gr. I. E. ii. 456; Tasch. Zeits. Ges. Nat. 1865, p. 71, ♀; Thoms. O. E. xix. 2115 et xxi. 2349, ♂ ♀.

♀. Black. Epistoma prominent. Antennae with joints seven to eleven white. Thorax immaculate; metathorax smoothest laterally at the base, its basal costa bisinuate, the apical centrally obsolete; apophyses

distinct but not strong. Scutellum and abdomen black; the latter with the first segment slightly curved laterally, dorsally feebly canaliculate, with somewhat projecting spiracles; terebra one-third length of abdomen. Legs red, with coxae and trochanters black. Wings not fasciated; nervelet small, radix and tegulae infusate. Length, 12 mm.

The colour of the ♂ legs is similar to that of *C. tarsoleucus*, but the pale frontal orbits produced below, the occasional large facial and clypeal mark, the frons not foveate between the scrobes, the grey-haired and not sub-cyaneous abdomen, as well as the white-marked front or anterior trochanters and front coxae, callosity beneath radix and margin of tegulae, render it distinct.

Than *C. moschator* the present species is larger and stouter, with thicker antennae and shorter terebra, the mesonotum more densely and finely punctate, the hind tibiae and tarsi red, of which the latter are pale-banded or, in ♂, broadly white; the ♂ may be known by its white-marked face and clypeus, its scutellum unusually also bearing a white mark.

From *C. viduatorius*, also, the colour of the hind legs, the larger and stouter body, and nearly totally black frontal orbits will distinguish it.

This common Continental species is recorded from Heigham, Brundall and Horning Ferry, in Norfolk by Bridgman, and from Stonehouse in Devon, at the end of March, by Bignell. The males were not uncommon upon *Angelica sylvestris*, with *Acroricnus macrobatus* at Matley Bog in the New Forest in the middle of August, 1901; I have also received it from Thornley, who took it at South Leverton in May, 1896.

6. viduatorius, Fab.

Cryptus viduatorius, Fab. Piez. 70, ♀; Gr. I. E. ii. 476 et i. Suppl. 700; Ste. III. M. vii. 280; Tasch. Zeits. Ges. Nat. 1865, p. 70; Voll. Pinac. pl. vi. f. 5 (details); Thoms. O. E. 479, ♂ ♀; cf. lib. cit. xxi. 2351, var. ♂, et Brisch. Schr. Nat. Ges. Danz. 1879 p. 332, var. ♂ ♀.

Head black; of ♂ with internal orbits, a facial and clypeal mark, the palpi and most of the mandibles, white, of ♀ rarely with interior and sometimes a mark in centre of exterior orbits, and another on the cheeks, flavescent, labrum rufescent and palpi infusate, its epistoma prominent. Antennae of ♂ sub-setaceous, with scape white beneath; of ♀ more slender and filiform, with the central joints more or less white above and the basal ones rarely rufescent. Thorax generally with a dot beneath, more rarely also a line before, the radix white; metathorax of ♀ finely longitudinally rugose, with both costae fine but entire, of ♂ confluent punctate, with only the basal costa complete and the petiolar area sub-discreted; apophyses sub-acute. Scutellum marked with pale flavous. Abdomen black, of ♂ narrower than thorax and apically sub-compressed; basal segment smoother in ♂, sub-linear, with the post-petiole slightly broader and the spiracles sometimes prominent; of ♀ oblong-ovate, the post-petiole sub-quadrate and second segment sometimes sub-castaneous, or with the margin castaneous; terebra shorter than abdomen, with spicula red. Legs slender and red; coxae and trochanters black, anterior of ♂ white-marked beneath; hind tarsi and tibiae apically nigrescent, the former in ♂ with central joints ferrugineous or whitish; tibiae of ♀ spinulose. Wings darker in ♀; tegulae wholly or partly white; nervelet indicated. Length, 8-10 mm.

Thomson mentions a ♂ with lateral white pronotal lines which extend back to the humeri; and Brischke found both sexes with the second segment almost entirely red, and a female in which the whole abdomen, excepting the petiole, was red.

This species may be known by its entirely or partly white scutellum and tegulae, evidently spinulose hind tibiae and small size; the white hind tarsal band of the ♂ is inconspicuous and often wanting.

C. viduatorius is a very common species everywhere from May to August on flowers and in the sweep-net; it is said by Boie (Stett. Ent. Zeit. xvi. p. 94) to possess the power of running on the surface of water like a *Hydrometra* (and perhaps *Trichocryptus cinctorius*); he considered it somewhat doubtfully parasitic upon *Nonagria typhae*; and in France it has been bred from *Eupithecia oxycetrata*. It has been recorded from Netley (Grav.); London and Salop (Stephens); Norwich (Bridgman); Isle of Man (Walker); Essex (Harwood); Hastings District (Hast. List); Whitsand Bay (Bignell); I have seen specimens from Felixstowe, taken by Hocking; Shotover and Bovey Tracey by Hamm; Abinger Hammer by Butler; Scarborough by Elliott; Plumstead by Beaumont; Lyndhurst by Adams; Lynton by S. Edwards; Guernsey by Luff; Felden by Piffard; Monks' Wood and Mablethorpe by Thornley; Barmouth by Yerbury; Deal by W. Saunders; Kingsdown and St. Margaret's by Sladen; and Shere by Capron. I have taken it at Upware in Cambs. in June; at Barnby Broad and at Farnham in Suffolk; and Chitty at Kingsdown and Huntingfield in Kent, in August.

7. *sponsor*, Fab.

Ichneumon sponsor, Fab. E. S. ii. 153, ♀. *Cryptus sponsor*, Fab. Piez. 83; Gr. I. E. ii. 554 et i. Suppl. 704; Ste. Ill. M. vii. 288; Tasch. Zeits. Ges. Nat. 1865, p. 85, ♀; Voll. Pinac. pl. vi. f. 6, ♂; Tschek, Verh. z.-b. Ges. 1870, p. 119; Thoms. O. E. v. 480, ♂ ♀; cf. *lib. cit.* xxi. 2351 (*nec* Ratz.). *C. quadrilineatus*, Gr. I. E. ii. 535; Ste. Ill. M. vii. 285, ♂. Var. *C. filicornis*, Ratz. Ichn. d. Forst. i. 141, ♀. *C. attentorius*, Tasch. Zeits. Ges. Nat. 1865, p. 79, excl. ♀.

Black, somewhat shining, with white pubescence. Head with clypeus apically deflexed and slightly rounded, frons impressed with a central sulcus; of ♀ with cheeks somewhat short and sub-buccate, and frontal orbits narrowly white; of ♂ with mandibular spots, centre of face, whole facial orbits and part of external, white. Antennae black, of ♀ with central flagellar joints white. Thorax usually with white pronotal fascia; ♂ also with a spot on mesonotum, two triangular and often basally confluent marks in the petiolar area, a callosity before and line beneath radix, white; metathorax shining, rugosely punctate; juxtaaxal areae distinct, the lateral broadest in centre of metapleurae, in ♂ before their centre; both transverse costae distinct; petiolar area small and sub-hexagonal, basally sub-arcuate; apophyses distinct but not stout, spiracles linear. Scutellum of ♀ black, of ♂ apically white. Abdomen very finely alutaceous, ovate-fusiform in ♀, and sub-linear in ♂; castaneous, in ♀ with base or whole of first segment black; basal segment of ♀ gradually dilated with post-petiole sub-quadrate, of ♂ laterally straight and hardly explanate apically, convex and nitidulous; terebra longer than half abdomen, spicula red. Legs sub-elongate, red; coxae entirely castaneous or black-marked; trochanters and apices of hind femora and tibiae nigrescent; posterior and sometimes part of front tarsi, and of the anterior femora, infusate; ♂

with hind tarsal band, and marks on front or anterior coxae and trochanters, white; ♀ with front tibiae stout. Wings distinctly clouded towards their apices, stigma of ♀ pale; radix and tegulae dark, the latter white-marked in ♂; nervelet short; areolet pentagonal and somewhat large, its sides strongly convergent above; nervellus evidently post-furcal and intercepted just below its centre. Length, 10-12 mm.

The colour of the coxae and position of the nervellus will render this species distinct; the ♀ very rarely has the antennae entirely black. Gravenhorst points out that it is similar to *C. Dianae*, but that the antennae are a little shorter and stouter.

Stephens says this widely distributed European species used to be not uncommon near London, in June, and in Salop; Gravenhorst records it from Netley, bred from *Noctua palligera* and on *Umbelliferae*, in June and July. The variety *filiformis* has been bred by Ratzeburg from *Trachusa piniperda*. I know of no recent British record.

8. apparitorius, Vill.

Ichneumon apparitorius, Vill. Linn. Ent. iii. 143, ♀. *Cryptus apparitorius*, Gr. I. E. ii. 499; Ste. Ill. M. vii. 283; Tasch. Zeits. Ges. Nat. 1865, p. 83, ♀. Var. *C. pungens*, Gr. I. E. ii. 505, ♀.

Head black, with traces of white at internal and external orbits; epistoma distinctly prominent. Antennae centrally white above. Thorax black, with white callosity beneath radix; metathorax centrally longitudinally rugose, with petiolar area strongly emarginate basally, and the spiracles large and elongate. Scutellum mainly, and post-scutellum, white. Abdomen ovate, castaneous; petiole alone black and laterally curved; post-petiole laterally straight, quadrate and centrally sub-canaliculate, with prominent spiracles; terebra nearly as long as abdomen. Legs red, coxae and trochanters entirely black; hind tibiae and tarsi infusate, the former rufescent basally, the latter with central joints somewhat paler. Wings only slightly clouded, with the nervelet distinct. Length, 10 mm. ♂ unknown.

The variety *pungens* differs in nothing but in having the post-scutellum and callosity beneath the radix immaculate, and the post-petiole somewhat laterally rounded.

Coombe Wood in June and elsewhere about London (Stephens). This would appear to be the only record outside Germany, and must be regarded as somewhat doubtfully reliable.

9. attentorius, Schäf.

Ichneumon attentorius, Schäf. Ic. pl. clxxv. f. 7. *Cryptus attentorius*, Gr. I. E. ii. 492, ♀; Tasch. Zeits. Ges. Nat. 1865, p. 79, excl. ♂; Tschek, Verh. z.-b. Ges. 1870, p. 125, ♂ ♀. *C. obscurus*, var. 2, Gr. I. E. ii. 551; var. 2, Tasch. Zeits. Ges. Nat. 1865, p. 86, ♂.

Head black, with palpi ferruginous; ♀ epistoma not prominent; ♂ sometimes with a mandibular dot, and the internal orbits obsoletely, pale. Antennae of ♀ sub-filiform, rather longer than half the body, with flagellar joints not elongate and the central five white above; of ♂ with scape sometimes testaceous beneath. Thorax black; metathorax broad, longitudinally rugose with no costae; the anteriorly foveate apices of the denti-

paral areae indicated by a dentiform costa; apophyses obtuse and rising from low on petiolar area; spiracles large and elongate. Scutellum of ♀ white and somewhat broad; of ♂ black, deplanate and apically strongly contracted. Abdomen red or badious, of ♀ oblong-ovate and as broad as thorax, with the petiole alone black, of ♂ with the anus as well as the whole of the basal segment and other irregular markings also black; basal segment of ♀ somewhat strongly explanate and laterally curved; post-petiole glabrous, sub-quadrate with three straight sulci, as long as and twice broader than the petiole; ♀ anus obtuse, terebra nearly as long as abdomen, with spicula red. Legs somewhat elongate, black; anterior tibiae and femora, except the intermediate femora basally, red; apices of the hind femora and base of their tibiae ferrugineous; posterior tarsi of ♂ centrally white. Wings of ♀ slightly clouded, more distinctly towards the apices; stigma dull testaceous; radix and tegulae piceous, former in ♂ whitish; nervelet elongate. Length, 6-7 mm.

The female is said to resemble that of *Mesostenus ligator*, but to be possessed of a longer terebra and pentagonal areolet.

It is extremely doubtful if this species, as now understood, has ever been taken in Britain, though recently recorded from Essex by Harwood. *C. attentorius*, Panz., was introduced in our fauna by Marshall, in 1870, as representing *C. quadrilineatus* of Stephens, which is now, through the correction of an error of Taschenberg, ascribed to *C. sponsor*, Fab. Its Continental range lends probability, however, to its occurrence with us.

10. *obscurus*, Grav.

Cryptus obscurus, Gr. I. E. ii. 548, excl. var. 2; Ste. Ill. M. vii. 287; Ratz. Ichn. d. Forst. i. 141; Fonsc. Ann. Soc. Fr. 1850, p. 376; Holmgr. Sv. Ak. Handl. 1854, p. 51; Tasch. Zeits. Ges. Nat. 1865, p. 86; Tschek, Verh. z.-b. Ges. 1870, p. 114, ♂ ♀; Thoms. O. E. v. 481 (part), excl. ♂. Varr. *C. Dianae*, Gr. I. E. ii. 545, ♂ et var. 3. (?) Var. *C. difficilis*, Tschek, Verh. z.-b. Ges. 1870, p. 117, excl. ♀.

Shining, punctate, with white pubescence. Head black; clypeus discreted, apically depressed and truncate; epistoma prominent, frons excavate with a central sulcus; of ♂ with mouth, a central spot, and part of orbits white; of ♀ with part of orbits very narrowly pale. Antennae black, of ♂ with scape white beneath, of ♀ immaculate. Thorax black, of ♂ with sometimes the pronotum, of ♀ with a dot beneath the radix, pale; metanotum longitudinally rugose, the lateral and the sub-hexagonal petiolar areae complete, the former broadest at the apical third of metapleurae, and with their apical margin INDISTINCT with strong strigosity, latter broader between the sub-obsolete apophyses than centrally long. Scutellum entirely black. Abdomen very finely alutaceous, ovate-fusiform, and in ♂ sub-linear, dark red with black basal segment, which is laterally curved to spiracles, and thence parallel-sided, with weak carinae in ♀, in ♂ elongate and laterally straight, with weak spiracles; terebra nearly than half abdomen. Legs red; anterior femora, tibiae and tarsi darkish red; apex of hind tibiae and femora infusate; hind coxae sparsely punctate and shining beneath; hind tibiae spinulose and tarsal claws of ♀ distinctly denticulate basally; ♂ with hind femora nigrescent, front or anterior trochanters marked, and the hind tarsi banded, with white. Wings not clouded; areolet pentagonal, nervelet short. Length, 15-17 mm.

The male sometimes has the intermediate or hind femora black marked, the latter at others being nearly entirely black; the female sometimes has a mandibular mark, the clypeus and the hind coxae internally, red; at others it has the anterior tarsi explanate, with the three central joints short and encircled by bristles.

The male differs from that of *C. albatorius* in having only the facial orbits and sometimes an epistomal dot white, the frons anteriorly excavate, the femora mainly black, with the anterior coxae and trochanters white-marked, with the basal segment dull and finely coriaceous.

This and the next species may be known by the nitidulous frons, subbuccate cheeks and obsolete apophyses.

Thomson says the male varies in the following directions:—hind femora at base and apex black (var. *difficilis*), or also black above; the epistoma and clypeus laterally black, and sometimes, in addition, the scutellum with only an apical white dot and the upper margin of the pronotum with only dots at the humeri and before the tegulae (*Dianae*, var. 3) or the scutellum and margin of pronotum may be immaculate (*Dianae*, ♂, Grav.).

Cryptus obscurus is an abundant species throughout Britain, and frequently bred from *Noctua plecta*, *Taeniocampa populeti*, *Hadena thalassina* (Buckler); *Zygaena filipendulae* (Entom. 1883, p. 35), *Smerinthus populi* at the end of May, in Devon (Bignell); *Bombyx quercus* (Laboulbène); *Dianthaecia capsicola*, *Tenthredo instabilis*, Kl., *Taeniocampa cruda* (Marshall); and *Euchelia jacobaeae* (Entom. 1884, p. 67). In February, 1893, I dug up a chrysalis of *Taeniocampa gothica* at Ipswich, the inside of which was entirely occupied by a parasite's cocoon of a dull brown colour and rough texture. On the 12th of April following, a female of the present species emerged from it through a large and irregularly circular hole on one side of the capital extremity, from which the operculum was entirely removed. I have also found the species dead in Noctuid chrysalids beneath aspen bark at Brantham, and imagines have occurred to me at Clopton, Brandon and Barham in Suffolk, flying along hedges, in June and July. Tuck has sent me examples from Bury St. Edmund's; Piffard from Felden; Cross from Ely; Clutten from Burnley; Capron from Shere; Miss Chawner from the New Forest; and Hamm from Reading and Oxford. It has also been recorded from London, Devon, Salop, Scotland, Netley; as very common in Norfolk, where Wainwright has found it at West Runton; Land's End, Bradley Wood in Yorks., St. Issey in Cornwall, Carlisle, Little Moor in Wigton, Essex, and the Hastings District. G. Stockby records it (The Naturalist, 1854, p. 228) as having been not uncommon in Hainault Forest, in June; Chitty has taken it at Huntingfield and St. Margaret's Bay in Kent.

11. *albatorius*, Vill.

Ichneumon albatorius, Vill. Ent. Linn. iii. 156, ♂. *Cryptus albatorius*, Gr. I. E. ii. 536; Ste. Ill. M. vii. 285; Tasch. Zeits. Ges. Nat. 1865, p. 82, ♂; Tschek, Verh. z.-b. Ges. 1870, p. 117, ♂ ♀. *C. obscurus*, Gr. I. E. ii. 548, ♀ (part); Thoms. O. E. v. 481, xxi. 2351, ♂.

Shining, punctulate, profusely pubescent. Head black, narrowed posteriorly, with white pubescence; clypeus discreted, apically depressed and broadly rounded; frons excavate, with a central sulcus; occiput deeply

emarginate, vertex narrow, temples excavate, eyes prominent; of ♂ with face, cheeks, mandibles and nearly the whole orbits, white; of ♀ with mouth ferrugineous, frontal and external orbits white. Antennae of ♀ filiform and immaculate, of ♂ setaceous, with scape white beneath. Thorax black and pubescent; of ♂ with pronotum, lines before and beneath radix and propleurae white, sometimes also mesosternum, dots on metapleurae and in the petiolar area; of ♀ with a dot beneath radix white; metanotum finely scabrous, with all the ♀ costae fine but distinct; lateral areae alutaceous, with the apical margin DISTINCT and arcuate; petiolar area entire, elongate, longitudinally strigose, basally narrow and arcuate; spiracles elongate. Scutellum black, of ♂ apically or entirely white. Abdomen very finely alutaceous, fusiform and in ♂ sub-linear, red, with only the basal segment black; this latter in ♂ is sub-linear, convex and glabrous, with prominent spiracles; terebra longer than half abdomen. Legs elongate, of ♂ distinctly pubescent, red; coxae, trochanters and hind tibiae, with apices of their femora, black; ♂ with anterior coxae and trochanters marked with, and the hind tarsi nearly entirely, white. Wings hardly clouded; areolet pentagonal, narrow and nearly coalesced above; nervelet very short, ♂ tegulae white and radix piceous. Length, 10-14 mm.

Thomson says the typical male of his *obscurus*, which is Tschek's *albatorius*, has the head with the inner and outer orbits, interrupted above, confluent with the cheeks, the face, mouth, scape beneath, scutellum, callosity beneath radix, tegulae, a lateral line extending to the humeri on the pronotum, with its front margin and its sides in the centre, together with the anterior coxae and trochanters beneath, pale flavous; the hind legs with femora only narrowly black basally, their tarsi white, with the fifth joint ferrugineous and the base of the first broadly black.

The female of this species was confused with that of *C. obscurus* by the older authors, but is well differentiated by Tschek, who says its metanotum is much more finely rugose, and that the lateral areae are broadest much nearer the spiracles, with their apical margin distinct and not obscured by strigosities as in the last species. Thomson has greatly confused the two kinds, but the colour of their ♂ ♂ is abundantly distinct; that of the present species has the face entirely white and the hind femora mainly red, and it is, too, distinctly smaller than *C. obscurus*.

This species has hitherto been much mixed in Britain with the preceding and with *Microcryptus perspicillator*, with which it was erroneously synonymized by Marshall, and many of the records there enumerated may appertain to it. It has been found at Shipley Bridge, Brent; Shaugh Bridge and Bickleigh, in May, by Bignell; Copdock in Suffolk by Hocking; Essex by Harwood; in the New Forest by Miss Chawner; at Shere in Surrey by Capron; Felden in Herts. by Piffard; and I have found it in June, in Wicken Fen. On 5th May, I have bred this species from the pupa of *Tueniocampa* sp., dug by Clutton during the preceding autumn at Burnley; the cocoon of the parasite in this case was much paler and less stout than that of *C. obscurus*. Tuck has also sent it to me from the flowers of *Chaerophyllum sylvestre*, at Tostock, near Bury St. Edmund's, early in June.

12. *Dianae*, Grav.

Cryptus Dianae, Gr. I. E. ii. 545, excl. ♂ et var. 3; Ste. Ill. M. vii. 287 (part); Tasch. Zeits. Ges. Nat. 1865, p. 84, ♀; Thoms. O. E. v. 482 et xxi. 2352, ♂ ♀. *C. gracilicornis*, Gr. I. E. ii. 553, ♀. *C. stenogaster*, Gr. lib. cit. 529, ♂. Varr. *C. leucostomus*, Gr. lib. cit. 531, ♂; *C. spectator*, Gr. lib. cit. 529, ♂.

Head triangular, epistoma prominent, frons excavate, sub-rugose and dull above ocelli; of ♂ with palpi ferrugineous, base of mandibles, labrum, transverse clypeal line and the internal orbits, of ♀ with cheeks sub-compressed, either immaculate or with internal frontal and vertical orbits narrowly white. Antennae very slender, setaceous; of ♀ generally white-banded, of ♂ nearly length of body. Thorax immaculate; metanotum with transverse costae distinct and longitudinally rugose; apophyses very distinct, spiracles elongate. Scutellum entirely black; of male rarely with testaceous dot. Abdomen of ♂ linear, much narrower than thorax, of ♀ fusiform; red, with base of first, apex of third or fourth, and the following segments entirely, black; basal segment of ♀ laterally curved; post-petiole deplanate, obsoletely canaliculate, its posterior angles obtuse and the ♂ spiracles large and prominent; terebra rather shorter than abdomen. Legs red; coxae and trochanters black, of ♂ with anterior sparingly white-marked beneath; apices in ♀, most or whole in ♂, of hind femora, of the spinulose hind tibiae and the hind tarsi, black; ♂ with hind tarsi centrally ferrugineous, of ♀ sometimes flavous or unicolorously nigrescent, its onychii black. Wings usually distinctly clouded; nervelet present; stigma usually ferrugineous, of ♀ sometimes testaceous; radix and tegulae dark, internal fenestra large; areolet not large, obviously convergent above; nervellus intercepted far below centre. Length, 8-11 mm.

Both sexes of this species may be known by the elongate epomiae, fulvous post-petiole and femora and tibiae, and the black apices to both the hind femora and tibiae. The frons is more roughly sculptured and duller than *C. obscurus*, the cheeks are less buccate and the male petiolar spiracles more prominent.

Of the varieties, *leucostomus* has the scutellum, external orbits in part and often the whole clypeus, flavidous; the abdomen apically compressed, with the second segment black. *Spectator* has scutellum apically white, the central segments castaneous; coxae, trochanters and hind legs entirely black, with radix and tegulae infusate. *Gracilicornis* differs in having no white flagellar band and the three apical segments obsoletely paler at the margin. *Stenogaster* has the coxae and trochanters immaculate.

This species is said to have been not uncommon about London by Stephens, and I have seen examples from Wellington College, Reading, in June, taken by Hamm. It is recorded from Bawsey Heath in Norfolk, by Bridgman; and from Essex by Harwood. Both sexes have been bred from *Cidaria picata* (Proc. S. Lond. Soc. 1896), and the var. *leucostomus* from *Trachea piniperda*. But its headquarters appear to be in the New Forest, whence Miss Chawner and Adams have sent it to me, and where I have found the female by no means rarely on *Angelica sylvestris* flowers in the middle of August at Matley Bog, together with a specimen of the male var. *leucostomus*. Morice has given me the male from Pyrford, in June.

13. *armatorius*, *Fab.*

Ichneumon armatorius, *Fab.* E. S. ii. 134, ♀. *Cryptus armatorius*, *Fab.* *Piez.* 71; *Gr.* I. E. ii. 502, ♀; *Tasch. Zeits. Ges. Nat.* 1865, p. 84 ♂ ♀. *C. spinosus*, *Gr.* I. E. ii. 558, ♂ ♀; *Tasch. Zeits. Ges. Nat.* 1865, p. 84; *Brisch. Schr. Nat. Danz.* 1879, p. 332, ♀; *Thoms. O. E.* v. 482; *xxi.* 2353, ♂ ♀.

Head with internal and often external orbits narrowly whitish; clypeus usually with a stramineous dot, epistoma prominent; frons excavate nearly to ocelli, coriaceous-rugose and somewhat dull; cheeks narrow. Antennae nearly filiform, with four central joints whitish in both sexes. Thorax immaculate; metanotum centrally longitudinally rugulose, with transverse costae distinct; apophyses acute, stout and compressed; spiracles linear. Scutellum (in type form) white at apex. Abdomen red or castaneous throughout, of ♀ not convex; post-petiole laterally straight and divergent, dorsally deplanate, with carinae distinctly elevated; terebra longer than half abdomen. Legs of ♂ black with front tibiae internally ferrugineous; of ♀ more or less black, with the anterior femora ferrugineous or testaceous apically, the anterior tibiae and tarsi generally more or less internally rufescent or testaceous; front tibiae sub-dilated. Wings broadly clouded at inner and apical margins; radix and tegulae infusate or black, latter rarely white; areolet not large, its sides obviously convergent above; internal fenestra and nervelet large; nervellus intercepted far below the centre. Length, 8-10 mm.

C. spinosus, *Grav.*, by which name this species has hitherto been incorrectly known, differs slightly in having the scutellum, external orbits, clypeus and base of first abdominal segment, entirely black, with the terebra perhaps a little longer; there can be no doubt, however, that it is synonymous with *I. armatorius*, *Fab.*, which latter name must consequently take priority.

This species has the head and thorax more strongly punctate than *C. Dianae*, and is abundantly distinct in its stout apophyses, the conspicuous carinae of the post-petiole, which is entirely in the female, apically in the male, red, and in all the femora being basally black, except perhaps sometimes the anterior of the male.

It would appear to be a rare species with us and not extending north of the Thames; it is much more frequent in southern than in northern Europe. *Marquand* records it from the Land's End district, and I have seen a specimen taken by *Luff* in Alderney. It was first recorded as British by *Desvignes* in 1856, on the strength of examples in his own collection; and *Chitty* has, I believe, recently found it at Loch Awe in May.

14. *minator*, *Grav.*

Cryptus minator, *Gr.* I. E. ii. 556 et i. *Suppl.* 704, excl. var.; *Ste.* *Ill. M.* vii. 288; *Ratz. Ichn. d. Forst.* iii. 140; *Tasch. Zeits. Ges. Nat.* 1865, p. 81; *Thoms. O. E.* v. 485 et *xxi.* 2353, ♂ ♀; cf. *Brisch. Schr. Nat. Ges. Danz.* 1879, p. 332.

Head with scrobes distinct and epistoma prominent; frons not excavate above ocelli, vertically not rugose, laterally smooth and dull; clypeus of ♂ discreted and apically broadly rounded; both sexes with internal orbits pale and cheeks immaculate; ♂ also has a facial and a clypeal mark, the mandibles except at apex, labrum and palpi, white. Thorax immaculate; metathorax not smooth at base, with transverse costae distinct, the basal

bisinate in ♀ and curved in ♂; apophyses slender and sub-acute, spiracles oval-circular. Scutellum black. Abdomen red, with the laterally curved first segment basally or entirely, and the anus, nigrescent; of ♂ gradually dilated to the fifth segment, with the post-petiole narrow and only slightly broader than the base of petiole, smooth, with spiracles prominent and apical angles obtuse; terebra only slightly shorter than abdomen. Legs red; coxae, trochanters, hind tibiae, their tarsi and, in ♂, their femora above, nigrescent; ♂ with front coxae and trochanters dotted with, and third and fourth joints of hind tarsi, white; front tibiae stout. Wings clouded; radix and tegulae dark, latter rarely white; areolet not large, obviously convergent above; nervelet distinct, nervellus intercepted far below the centre. Length, 6 mm.

Gravenhorst says that the size and outline of the female resemble those of *C. sponsor*, but that the antennae are rather more slender, and the areolet is apically narrow. The male is distinctly more slender than the female with the antennae thinner. His variety with darker legs is probably referable to *C. macellus*, Tschek.

This species, which Stephens says used to be not very common about London and in Shropshire at the end of June, was sent by Hope to Gravenhorst from Netley; Parfitt beat it from trees in Devon in July; and I possess specimens recently taken by Capron about Shere; Saunders at Greenings; Miss Alderson at Worksop in June; and Yerbury at Much Markle in Hereford, in May. It occurs throughout northern and central Europe, and Ratzeburg has bred it in Germany from *Hylotrupes bajulus*.

15. *tuberculatus*, Grav.

Cryptus tuberculatus, Gr. I. E. ii. 501; Ste. Ill. M. vii. 283; Tasch. Zeits. Ges. Nat. 1865, p. 83, ♀; Thoms. O. E. v. 485 et xxi. 2354, ♂ ♀. *C. investigator*, Tschek, Verh. z.-b. Ges. 1870, p. 123, ♂ ♀.

Shining and punctulate, with white pubescence. Head black; frons impressed with small central furrow, not excavate above ocelli, scrobes distinct; clypeus apically depressed and truncate, epistoma prominent; of ♀ with internal and external orbits narrowly, of ♂ with internal orbits broadly, white. Antennae nearly filiform; centrally white above in ♀. Thorax with pronotum dotted or margined with, and a line below radix, white; metanotum very coarsely rugose, with transverse costae sub-obsolete; apophyses acute, spiracles oval. Scutellum apically white. Abdomen finely alutaceous, of ♂ linear and of ♀ oblong-ovate, red, with the petiole laterally, the anus slightly, infusate; basal segment of ♀ laterally curved, dorsally smooth and shining, with prominent spiracles; post-petiole bicarinate, of ♂ gradually dilated towards apex and not narrow, of ♀ quadrate or sub-transverse; terebra hardly longer than basal segment. Legs red, with coxae and trochanters black; hind tarsi infusate or in ♂ white-banded; ♂ with hind femora and apex of hind tibiae black; front tibiae stout and hind ones of ♀ distinctly spinulose. Wings clouded; radix piceous, tegulae and stigma white-marked; areolet not large, obviously convergent above; nervelet elongate; nervellus intercepted far below centre. Length, 6-8 mm.

This species is similar to *C. minor*, but it has the frons more broadly excavate and sub-rugose, the scutellum and tegulae white-marked, the

spiracles of the metathorax longer, the female terebra shorter and the male post-petiole broader.

Tschek mentions two varieties of the female, the first of which has the hind femora infusate or black, and the second, in addition, has the scutellum and a callosity beneath the radix black.

Stephens records this species, which is common throughout north and central Europe, from the London district, in June. I have seen a male captured by Yerbury at Pembridge, in July, and have myself taken it on elm in the same month at Ipswich.

HABROCRYPTUS, Thomson.

Thoms. O. E. v. (1873), 498.

Head triangular, declived behind ocelli; vertex narrow and centrally angularly emarginate; eyes somewhat strongly convex; clypeus prominent, sub-gibbose, mutic and deflexed before apex. Antennae filiform, of ♂ with narrow white band. Metathorax not short; spiracles small and sub-circular; apophyses wanting; mesosternal sulci deeper behind the centre. Abdomen of ♀ fusiform and centrally red, of ♂ centrally more or less black; anus not white-marked. Wings with areolet small and convergent above; radix white.

There appear to be but seven palaearctic species contained in this genus, although *Cryptus geminus*, Grav., and four of Tschek's new species are doubtfully referred to it by Schmiedeknecht. Much confusion has existed in our collections regarding the first two here enumerated, of which the sexes are so dissimilar as to render their association for long a matter of considerable doubt.

Table of Species.

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| (6). | 1. Thorax black. | |
| (5). | 2. Hind tibiae not basally white. | |
| (4). | 3. Scutellum white and anus not black in ♀ ;
♂ with three hind tarsal joints white | 1. PORRECTORIUS, Fab. |
| (3). | 4. Scutellum and anus black in ♀ ; ♂ with two
hind tarsal joints white | 2. BRACHYURUS, Grav. |
| (2). | 5. Hind tibiae distinctly white basally..... | 3. ALTERNATOR, Grav. |
| (1). | 6. Thorax mainly red | 4. MINUTORIUS, Fab. |

1. porrectorius, Fab.

Ichneumon porrectorius, Fab. M. I. 260, ♂. *Ischnus porrectorius*, Gr. I. E. i. 642; Ste. Ill. M. vii. 208, ♂. *Ichneumon assertorius*, Fab. E. S. ii. 140, ♀. *Cryptus assertorius*, Fab. Piez. 76; Gr. I. E. ii. 495; Ste. Ill. M. vii. 281, ♀; Holmgr. Sv. Ak. Handl. 1854, p. 55, ♂ ♀; Tsch. Zeits. Ges. Nat. 1865, p. 90, ♀. *Habrocryptus assertorius*, Thoms. O. E. v. 498 et xxi. 2363, ♂ ♀. Var. *Ischnus sannio*, Gr. I. E. i. 646; Ste. Ill. M. vii. 208, ♂; *Habrocryptus brachyurus*, Thoms. O. E. v. 499 et xxi. 2363, excl. ♀. Var. *Cryptus sedulus*, Gr. I. E. i. Suppl. 701; Ste. Ill. M. vii. 282, ♀; (?) *C. unicinctus*, Gr. I. E. ii. 470, ♂.

The ♂ is a very slender insect; the ♀ broader and distinctly pubescent. Head of ♂ with palpi elongate, stramineous; clypeus, all the orbits, cheeks and whole or centre of face, white; of ♀ with clypeus discreted and basally longitudinally sub-carinate; internal orbits, a mark on the labrum, and sometimes also on the clypeus, white. Antennae slender and white-banded in both sexes, with scape fulvous beneath; of ♂

filiform, of ♀ setaceous, with basal flagellar joints ferrugineous at least beneath, and the first more than four times longer than broad. Thorax with pronotum, a line before and a dot beneath radix, white; ♂ also has two dots beneath the hind radices, two between the front and intermediate coxae, a mark on the metathorax and usually vittae on the mesonotum, white; metathorax of ♀ finely alutaceous, with basal area smoother, basal costae curved, the apical indicated only by the weak apophyses, its spiracles circular. Scutellum red, post-scutellum white. Abdomen of ♂ narrower than, of ♀ as broad as, the thorax and widest at apex of the third segment, dull and pubescent; of ♀ red, with anus not or hardly infusate, of ♂ with segments two to five parallel-sided, red, with apical margins white and the basal generally black, the remainder being black, with the central red coloration becoming gradually evanescent; basal segment smooth and black, of ♂ apically white, gradually dilated with the post-petiole sub-quadrate or sub-elongate; basal segment of ♀ slightly curved laterally, dorsally convex and glabrous with the apical angles obtuse, and the spiracles not prominent; second segment coarsely punctate and the remainder glabrous; terebra about half the length of the abdomen. Legs slender, elongate; anterior testaceous, with the coxae and trochanters black, or of ♂ mainly white; the hind ones red, with coxae and trochanters (excepting an apical white mark in ♂), and usually apices of femora and of tibiae, black; hind tarsi infusate, with the central joints white in both sexes. Wings hyaline; radix and tegulae flavescent, latter in ♀ sometimes infusate. Length, 6-9 mm.

The colour of this species is variable; the ♀ orbits, a mark behind the ocelli, the scutellum, post-scutellum and the second tarsal joint, are whitish-flavous; the abdomen is rufescent, with the anus not or scarcely black, the first segment gradually dilated, with post-petiole sub-arcuate and its dorsal carinae wanting, the second alutaceous, very finely punctate and pubescent, terebra slightly longer than half abdomen; the metathorax is abruptly arcuate centrally, with obsolete apophyses; the legs slender, with tibiae sub-spinulose and the front ones not inflated; the ♂ has the body linear, the head, thorax and coxae profusely white-marked; the first four abdominal segments apically white and sometimes discally black; and the three central joints of the hind tarsi white. From the next species it differs in the white capital and thoracic markings and at most narrowly infusate ♀ anus, the distinctly white-margined anterior segments, and at most three-jointed flagellar band of the ♂.

I have no hesitation in placing *C. sannio* as a mere variety of the male, since even Thomson was quite unable to distinguish it by any more salient characters than the less extensive colour of the thorax, of the hind femora, which are nigrescent, and of the tarsal joints, of which only the third and fourth are white.

The variety *sedulus* appears to be an intermediate form between this and the next species, with the abdomen entirely red, hind femora black, and the hind tarsi not white-banded; it is considered a distinct species by Thomson, who did not know it, and who doubtfully refers it to *C. uninctus*, which has white-banded antennae and immaculate thorax.

This is an abundant species in Britain, and has been recorded from Eaton in July by Bridgman; Bickleigh early in September; and bred at the end of July, from a pupa in a currant leaf, by Bignell; Acomb Wood near York, by Wilson; bred from *Depressaria nervosella* by Marshall;

from *Tortrix roseana* by Goureau ; from Devon in May, by Hocking ; from Lynton by S. Edwards ; and from Battle in Sussex, by Bloomfield.

Regarding its accelerated metamorphosis, Ratzeburg says a pupa of *Tortrix ribeana*, in a rolled apple leaf, was found to have an egg extruding on June 4th ; the latter developed into a larva on the 7th, spun up on the 14th, and emerged as a perfect Cryptid on the 24th. Towards the end of May the females may often be beaten from budding oak trees, and throughout the three following months both sexes are frequently swept from the herbage in woods. I possess specimens from Lynmouth, the New Forest, South Wales, Guestling near Hastings, Shere in Surrey, Felden, Treswell Wood in Notts., Delamere Forest, Lyndhurst ; and have found it from the Bentley Woods near Ipswich, in May, to the Blean Woods in Kent, in August. Chitty has found it at Huntingfield in Kent as late as 4th October.

2. *brachyurus*, Grav.

Cryptus brachyurus, Gr. I. E. ii. 572 ; Ste. Ill. M. vii. 290, ♀. *Habrocryptus brachyurus*, Thoms. O. E. v. 499 et xxi. 2363, excl. ♂ ; cf. Brisch. Schr. Nat. Ges. Danz. 1879, p. 334.

♀. Head coriaceous, with occiput closely punctate ; black, with frontal or vertical and sometimes facial orbits flavidous. Antennae slender and filiform, white-banded ; scape, and flagellum beneath and often basally, ferrugineous. Thorax with two dots on pronotum and another beneath radix flavous ; metathorax sub-pubescent, evenly scabrous throughout, with basal and lateral costae entire, apical costa wanting but apophyses indicated ; spiracles circular. Scutellum punctate, black. Abdomen elongate-ovate, very finely and evenly punctate, and as broad as thorax ; bright red, with three apical segments entirely black ; basal segment glabrous throughout, gradually dilated apically and hardly explanate at the obsolete spiracles ; terebra one-third of the length of the abdomen, with spicula castaneous and compressed towards the apex, its sheaths deflexed. Legs slender and red, coxae and trochanters black ; hind legs with apices of femora and tibiae and of the tarsal joints nigrescent. Wings slightly clouded, with outer nervure of the areolet somewhat short ; radix pale, tegulae piceous. Length, $6\frac{1}{2}$ mm.

The female of this species may be known by its black scutellum and broadly black anus. It closely resembles *H. porrectorius*, but has the vertical orbits flavidous-white, no hind tarsal band, the hind femora apically and segments five to eight black, the radial nervure is a little shorter and sub-inflexed. The rather finer sculpture of the less deplanate abdomen is the only structural difference I can detect between this and the last described species.

♂. Head coriaceous, with occiput closely punctate ; black, with vertical orbits alone flavidous. Antennae slender and filiform, with the four flagellar joints ten to thirteen entirely white and the scape somewhat ferrugineous beneath. Thorax with pronotum, a dot at the apices of the humeral lines and two small dots on the disc of the metanotum alone white ; metathorax pubescent, evenly scabrous throughout, with basal costa entire, and the lateral and apical wanting ; apophyses hardly indicated ; spiracles circular. Scutellum punctate, white ; post-scutellum immaculate. Abdomen cylindrical, broadest behind the centre, evenly

and not very finely punctate; black, with third, fourth, most of second and extreme apex of first segment castaneous; basal segment alutaceous, slightly and gradually dilated apically and hardly explanate at the distinct though inconspicuous spiracles; valvulae exerted and black. Legs slender, black, with front tibiae, apices of anterior femora and bases of posterior tibiae ferrugineous; three central hind tarsal joints determinately pure white. Wings hyaline; outer nervure of areolet somewhat short; radix white, tegulae black. Length, 7 mm.

The above male, here first ascribed to *H. brachyurus*, agrees much better therewith than *I. sannio*, with which the latter has so long been associated, and moreover I can nowhere find described anything like it. The type is in my own collection.

[I consider it probable that all the British references to *Cryptus hostilis*, Grav., of which no mention whatever is made by Thomson, may be assigned to the above species. The female was introduced as indigenous by Desvignes on the strength of specimens in his own collection, and subsequently found position in Marshall's catalogues, in the latter of which the author erroneously follows Taschenberg in presenting it as constituting the male of *H. brachyurus*. Both *I. sannio* and *C. brachyurus* are recorded by Stephens. Gravenhorst's description (I. E. ii. 512) of the true *C. hostilis*, which is placed in *Spilocryptus* by Brischke, and as synonymous with *Microcryptus nigrocinctus* by Schmiedeknecht, will show how different it is from *H. sannio*:—Palpi and mandibular mark red; antennae ferrugineous, with the scape fulvous or dull white beneath; scutellum and post-scutellum pale flavous. Abdomen narrower than the black thorax, oblong or fusiform, with segments two to four, apex of first and base of fifth, red; basal segment sub-linear, with post-petiole broader; legs red, with all the coxae, hind trochanters, apices of their femora and their tibiae, black; wings somewhat clouded, with radix pale flavous and tegulae wholly or partly testaceous. Length, 3–3½ lines.]

Stephens says he took both sexes in Darent Wood, etc., with *H. porrectorius*, in June. Bridgman records, "*Cryptus hostilis*, Grav.," from Earlham in Norfolk, in July and September; I have seen the "*hostilis*" recorded by Bignell, from Plym bridge, at the end of September, it certainly is a female of the present species. Professor Carr has, I believe, taken this species at Nottingham College in December; Martineau has found it at Solihull, in September; Capron once or twice at Shere; and Bignell gave me my male from the Plymouth district.

3. *alternator*, Grav.

Cryptus alternator, Gr. I. E. ii. 588; Holmgr. Sv. Ak. Handl. 1854, p. 53; Tasch. Zeits. Ges. Nat. 1865, p. 92, ♂ ♀. *C. annulipes*, Tasch. lib. cit. p. 100, ♀. *Habrocryptus alternator*, Thoms. O. E. v. 499, ♂ ♀; cf. lib. cit. xxi. 2364.

Black. Head immaculate, with clypeus discreted, of ♂ broadly rounded apically, of ♀ small with epistoma prominent. Antennae centrally white-banded and basally red in both sexes; of ♂ slender and filiform; of ♀ with first flagellar joint about four times longer than broad. Thorax immaculate; metathorax of ♀ scabriculous, of ♂ convex, with basal lateral costae alone visible; apophyses wanting, spiracles small and circular. Scutellum entirely black. Abdomen nearly as broad as thorax,

with segments two and three, and in ♀ most or whole of first, red ; of ♂ parallel-sided, very finely and closely punctate, with post-petiole as long as broad, canaliculate, gradually dilated towards the obtuse apical angles, of ♀ oblong-ovate, with post-petiole canaliculate, the petiole infusate and the anus with an obsoletely white membrane ; basal segment of ♀ very slightly explanate with straight sides, dorsally deplanate and glabrous with obsolete spiracles, of ♂ slightly curved laterally ; ♀ with second segment closely and finely punctate and the third apically the broadest ; terebra rather shorter than abdomen. Legs slender and red ; coxae, trochanters, hind femora except at base, and the base of the anterior, black ; hind tibiae black, the posterior basally white-banded ; posterior tarsi infusate, their basal joints and calcaria white. Wings sometimes clouded, with areolet of ♂ strongly convergent above ; radix white, tegulae black. Length, 5-7 mm.

The nervelet of the female is longer than that of *H. porrectorius*, and in the male is punctiform.

From the preceding, this species differs in its immaculate head and thorax, and in the hind tibial white basal band, in the female having the four apical segments black, with the seventh whitish and one or two hind tarsal joints white ; the coloration of the male is similar to that of the female, but the second and third segments are sometimes nigrescent.

This species, which is by no means uncommon on the Continent, was not introduced as British till the publication of Marshall's 1872 Catalogue ; and the only record I can find is that of Bignell's capture of it at Bickleigh early in August (Trans. Devon. Assoc. 1898, p. 484).

4. *minutorius*, Fab.

Ichneumon rubricator, Panz. F. G. lxxxiv. 14 (*nec* Thunb.) ♀. *Cryptus constrictor*, Fab. Piez. 84, ♀. *C. minutorius*, Fab. *lib. cit.* 72 ; Gr. I. E. ii. 625 ; Ste. Ill. M. vii. 294 ; Tsch. Zeits. Ges. Nat. 1865. p. 88 ; Tschek, Verh. z.-b. Ges. 1870, p. 135, ♂ ♀. *Habrocryptus minutorius*, Thoms. O. E. v. 500 et xxi. 2364, ♂ ♀.

Sanguineous red, shining, alutaceous, with white pubescence. Head black ; clypeus discreted and sub-prominent, with its apex rounded and sides depressed, centrally impressed transversely ; epistoma not prominent ; ♀ with orbits in part narrowly, sometimes also the palpi and a dot on the mandibles and on the cheeks, stramineous ; ♂ with face, orbits and cheeks also stramineous. Antennae slender, filiform ; scape black, of ♂ white beneath ; flagellum centrally white-banded in both sexes, of ♀ basally ferrugineous, with first joint about four times longer than broad. Thorax red, with pronotum, sterna and the scutellar region, black ; pronotum white-marked ; metanotum finely and transversely rugose, with the lateral areae complete and the petiolar wanting ; spiracles circular ; apophyses, at least in ♀, small and sub-acute. Scutellum of ♀ sanguineous red, of ♂, with post-scutellum, white. Abdomen densely punctulate ; of ♀ ovate and as broad as thorax, of ♂ linear-fusiform ; red, with the four apical segments, as well as sometimes in ♀ the disc of the third and the petiole, black ; ♂ with apices of first or third to fifth stramineous-margined ; ♀ with post-petiole convex and glabrous, rather longer than broad and gradually dilated towards the obtuse apical angles, and its second segment closely punctate ; terebra half the length of the abdomen.

Legs slender and red; coxae and trochanters, except the white-marked anterior of the male, and in ♀ the anterior femora basally, the hind ones entirely and the apices of the hind tibiae, black; ♂ with anterior femora and tibiae flavidous, and the hind tarsi white-banded. Wings a little clouded, with nervelet punctiform; radix and tegulae infusate, the former sometimes, and in ♂ the latter, white. Length, 5-6 mm.

This species is instantly known by its entirely sanguineous thorax.

It is said to occur somewhat sparingly throughout the whole of Europe, and Jurine found the female among *Aphides* on flowers. I know of no recent records, and have seen nothing like it, although Dale says it is abundant at Glanvilles Wootton, and Stephens thought the female not common at Darenth Wood and elsewhere about London in June.

CAENOCRYPTUS, Thomson.

Thoms. O. E. v. (1873), 494.

Apex of clypeus generally dentate centrally. Metathoracic spiracles small and circular. Abdomen with basal segment angularly curved. Front tibiae of ♀ inflated. Wings with lower exterior angle of discoidal cell rectangular or sub-acute, and situated almost further from the base than the small and laterally convergent areolet.

This genus is rendered distinct from all the allied ones by the shape of the discoidal cell, the white radix and small, laterally convergent areolet.

Thomson described seven new species under this genus, several of which should certainly be found to occur in Britain, but all the foreign authors have ignored the purely British *C. antennatus*.

Table of Species.

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| (2). 1. Scutellum white, front coxae, but not hind tarsi, white | 1. RUFIVENTRIS, Grav. |
| (1). 2. Scutellum black, hind tarsi, but not front coxae, white | 2. ANTENNATUS, Bridg. |

1. rufiventris, Grav.

Cryptus rufiventris, Gr. I. E. ii. 497; Ste. Ill. M. vii. 282; Ratz. Ichn. d. Forst. iii. 138; Tasch. Zeits. Ges. Nat. 1865, p. 92, ♀. *Caenocryptus rufiventris*, Thoms. O. E. v. 495 et xxi. 2360, ♂ ♀. (?) Var. *Cryptus eborinus*, Ratz. Ichn. d. Forst. iii. 137, ♂.

Sub-glabrous, black. Head with frons excavate; clypeus mutic, somewhat gibbose, in ♀ discreted and sometimes castaneous; epistoma prominent; labrum, all the orbits, a genal mark, and in ♂ clypeus and epistoma also, white. Antennae filiform; in ♀ with central band, in ♂ with scape beneath, white; basal flagellar joint of former four times longer than broad. Pronotum with two lines on either side, sometimes others upon the pleurae, two lateral dots upon metathorax, as well as callosities before and beneath the radix, white; metathorax of ♀ coarsely and confluent punctate, especially in the hexagonal petiolar area; lateral areae basally smooth and nitidulous; petiolar area reaching beyond the centre;

spiracles small and circular, situated in a longitudinal furrow. Scutellum, post-scutellum, and generally two dots below latter, white. Abdomen fusiform, of ♀ as broad as thorax; castaneous or red, with the petiole basally black; basal segment of ♀ laterally straight; post-petiole dilated and sub-deflexed; ventral segments three to seven prominent; terebra longer than half abdomen, spicula spinulose. Legs dark red; femora partly, hind tarsi and tibiae, infusate; front tibiae of ♀ dilated and nearly mutic, the anterior, and in ♂ their femora also, internally stramineous; ♂ with anterior coxae and trochanters entirely white, ♀ with front coxae black, white-marked, and the hind ones usually badious. Wings with a central cloud; radial nervure elongate, sub-inflexed; radix white, tegulae infusate; nervellus opposite and intercepted far below the centre, lower wing with median nervure not strongly curved. Length, 6 mm.

The colour of this species is somewhat variable in extent.

The variety *eborinus* is very distinct, with the thorax diffusely and apex of basal segment white.

Probably common but overlooked in Britain. Stephens records it from near London, in June, and Bignell from Cann Wood at the end of September. It has been several times bred from *Cemiosoma lotella*, Staint. (Marshall); *Talaeporia pseudobombycella* (Entom. 1881, p. 139); and on the Continent Ratzeburg reared his variety from a species of *Psyche*.

2. *antennatus*, Bridg.

Cryptus antennatus, Bridg. Trans. Ent. Soc. 1881, p. 153, pl. viii. fig. 10, ♀.

A finely and closely punctate species. Head black, slightly narrowed behind the eyes. Antennae filiform, slightly incrassate towards their apices. Thorax black, with notauli distinct; metathorax with two distinct transverse costae, and basal area entire and quadrate; spiracles small and circular. Scutellum black. Abdomen elongate-ovate, black, with the four basal segments red, the base of the first and apex of the fourth somewhat infusate; basal segment somewhat slender, gradually dilated to apex, where it is one-third broader than at base, spiracles not prominent; second quadrate, remainder transverse; terebra two-thirds of the length of the abdomen. Legs dull red, with coxae, trochanters and part of the tarsi, black; hind tibiae and apices of their femora, infusate; hind tarsi with the three central joints white. Wings with areolet pentagonal and normally broad above, emitting recurrent nervure from beyond its centre; nervelet minute; nervellus sub-opposite and intercepted just below its centre. Length, 3, 3·5, 2·5 mm.

Bridgman says (*loc. cit.*), "This insect apparently belongs to Thomson's sub-genus *Caenocryptus*"; and I am by no means convinced that it is not synonymous with that author's *C. inflatus* (*cf.* Opusc. Ent. v. 497 et xxi. 2361).

Two females were taken by Bridgman at Eaton near Norwich, on 4th April, 1874, but he did not again meet with the species (*cf.* Trans. Norf. Soc. 1893, p. 614), and it appears to have been quite ignored by all subsequent Continental authors.

MEGAPLECTES, Förster.

Först. Verh. pr. Rheinl. 1868, p. 186; *Iocryptus*, Thoms. O. E. v. (1873), 472.

Head not transverse; vertex declived behind ocelli, which are nearer each other than to the oblong eyes; frons excavate, cheeks elongate; clypeus discreted and apically deflexed, with the margin mutic and broadly rounded; maxillary palpi with second joint internally strongly dilated and the apical linear longer than the penultimate; mandibles not elongate, with apical teeth of equal length. Antennae with scape ovate-globose, excised beyond the centre; flagellum broadly white-banded, of ♀ spiral, centrally incrassate and apically attenuate, with the basal joint half as long again as second. Pronotum short; epomia distinct, abbreviated above; mesonotum declived anteriorly, notauli reaching to its centre; metathorax with basal area transverse and narrowed behind; areola nearly pentagonal with lateral costae sub-complete, costula and costella obsolete; apophyses distinct and obtuse; spiracles oblong. Scutellum with basal foveae deeply impressed. Abdomen fusiform; basal segment apically curved, its dorsal carinae nearly reaching the spiracles; second segment with gastrocaeli indicated, spiracles central and epipleurae narrow. Legs somewhat long and slender; tibiae mutic, tarsi setulose. Upper wings with stigma linear and radial cell elongate; areolet somewhat large and pentagonal, emitting recurrent nervure from its centre, its sides a little convergent above; fenestra not large, cubital nervure emitted from centre of discoidal cell; nervelet wanting, radial nervure hardly inflexed apically. Lower wings with median nervure not curved; nervellus opposite and intercepted slightly below the centre.

Only one species of this genus is known, the ♂ of which so closely resembles *Ichneumon* (*sensu lato*) that it was placed therein by Gravenhorst; and even Desvignes, who first described the ♀, left it in that vast genus.

i. *monticola*, Grav.

Ichneumon monticola, Gr. I. E. i. 108; Ste. Ill. M. vii. 127, ♂; Desv. Cat. 1, ♀. *Cryptus monticola*, Wesm. Bul. Ac. Brux. 1841, p. 363, ♂; Mém. couron. Ac. Belg. 1859, p. 9, ♀. *Iocryptus regius*, Thoms. O. E. v. 473, ♂ ♀ (*nec* Tasch.); *cf. lib. cit.* xii. 1236; xix. 2115; xxi. 2347.

Black, shining, with fuscous pubescence. Head and thorax immaculate. Antennae of ♂ with joints ten to eighteen white, and fourteen to twenty-two granulate beneath; of ♀ with joints seven to fourteen white. Metathorax pubescent, cicatrosely punctate, with distinct apophyses. Scutellum black. Abdomen atrocaeruleous, becoming cyaneous towards the apex and basally scabrously punctate; basal segment deeply canaliculate, its spiracles dentately prominent; the second punctate and somewhat dull, and the following segments nitidulous; terebra as long as the petiole, rather shorter than half the abdomen. Legs black, with apices of anterior femora, their tarsi and sides of their tibiae, sub-stramineous. Wings flavescens; stigma ferrugineous, radix and tegulae black. Length, 18-20 mm.

Thomson says this species is somewhat allied to *Phygadeuon* by the centrally incrassate ♂ antennae and the metathoracic sculpture.

Stephens tells us that this fine insect appears to be very rare in Britain, and that the only examples he had seen were captured in South Wales

in July; the only subsequent mention I can find is that of Desvignes' specimens. It has been bred in Germany from *Clostera anachoreta*, and in Sweden it occurs in late autumn; indeed it does not appear to emerge on the Continent, where it is widely distributed throughout the northern and central districts, until the end of September and October, and even then to be very rarely met with, which may account for the time elapsed since it has been noticed with us.

ACRORICNUS, Ratzeburg.

Ratz. Ichn. d. Forst. iii. (1852), 92; *Linoceras*, Tasch. Zeits. Ges. Nat. 1865, p. 105.

Head narrowed anteriorly, vertex declived; eyes strongly convex, internally sub-emarginate above antennae; face deplanate and narrowed towards mouth; frons smooth, with scrobes obsolete; labrum free; clypeus sub-deflexed, apically truncate and only laterally discreted; mandibles somewhat narrowed apically, with the upper tooth the longer; genal costa nearly contiguous with the oral. Antennae with flagellum filiform, basally sub-attenuate and, in ♀, cylindrical, with the joints not apically incrassate; scape short, sub-globose, slightly excised. Pronotum short; epomiae distinct, transverse, abbreviated above; mesonotum hardly declived anteriorly, notauli extending beyond its centre; mesosternum with lateral sulci entire, inflexed; metathorax short, costae distinct; spiracles large and linear. Scutellum gibbous. Abdomen elongate-fusiform, compressed; basal segment filiform, of equal breadth throughout, curved and very smooth, with spiracles only just behind centre; second segment with spiracles behind centre and thyridii some distance from base; terebra reflexed. Legs slender; anterior tibiae obsoletely spinulose, the front ones not inflated; calcaria elongate; fifth tarsal joint as long as third. Upper wings with the internal cubital nervure a little curved, its nervelet wanting; areolet large, emitting recurrent nervure from its centre, its sides hardly convergent above; cubital nervure emitted from centre of second discoidal cell. Hind wings with median and posterior nervures complete to apex; the humeral elongate and somewhat curved; nervellus post-furcal and intercepted nearly in the centre.



A. macrobatus, ♂ (after Ratzeburg).



Acroricnus macrobatus
metathorax.

This genus will at once be recognized by the filiform petiole, smaller lower mandibular tooth and curved internal cubital nervure. Four other palaearctic species are known, none of which are likely to occur in Britain.

Our single species has hitherto been referred to the genus *Linoceras*, which name is now considered to have been preoccupied. Förster (Verh. pr. Rheinl. 1868, p. 186) termed it *Xenodocon*, and Kriechbaumer (Ent. Nachr. 1878, p. 22; cf. also p. 251 et 1879, p. 3) further involved the synonymy by incorrectly referring it to *Osprynchotus*, Spin. (Guér. Mag. Zool. 1841, no. 75).

1. *macrobatus*, Grav.

Cryptus macrobatus, Gr. I. E. ii. 440; Zett. I. L. 368, ♂ ♀. *Linoceras macrobatus*, Tasch. Zeits. Ges. Nat. 1865, p. 106; Voll. Pinac. pl. vi. f. 1; Thoms. O. E. v. 475, ♂ ♀; cf. lib. cit. xxi. 2347 et Brisch. Schr. Ges. Danz. 1879, p. 331. *Acroricnus Schaumi*, Ratz. Ichn. d. Forst. iii. 92, ♂ (fig.). *Macrobatus clavator*, Holmgr. Sv. Ak. Handl. 1854, p. 50.¹

Head with black pubescence; of ♂ with face and mouth, except apices or whole of mandibles, flavous; of ♀ sometimes entirely black, but generally with internal orbits very narrowly flavous. Antennae shorter than body; more or less rufescent beneath; centrally flavous-banded in both sexes; ♂ with scape always pale beneath. Thorax with black pubescence, immaculate; metathorax strongly rugose, with dark pilosity and both transverse costae strong, the apical being centrally obsolete in the ♀. Scutellum black, punctate, with long black hairs and glabrous interstices. Abdomen broadest behind centre, black; apex of first segment and centre or sides of second usually castaneous, at least in ♂, which has the anus sub-compressed; petiole convex, extremely finely punctate and nitidulous; terebra slightly recurved, very nearly as long as abdomen, black, with long pilosity and red spicula. Legs pale red; coxae, trochanters and apices of the strongly curved hind tibiae, black; front coxae, and often their femora and tibiae, of ♂ flavous-marked beneath; all the tarsi of the ♂, and hind ones of ♀, stramineous-white, excepting the onychii and base of the metatarsi. Wings hyaline or distinctly clouded; radix ferrugineous, tegulae dark. Length, 12 mm.

The extent of alar infumescence is extremely variable.

This species would appear to have been considered very rare in Britain until recent years; it was first recorded by Desvignes, but Bridg.-Fitch (Entom. 1883, p. 37), had seen only one specimen, taken at Ventnor by Pascoe, in July, 1867. I have examined examples of both sexes, found by Hamm at Bovey Tracey, in August, 1899, 1900 and 1902; and in August, 1901, myself discovered the species, together with *Eumenes coarctata*, in some numbers at Matley Bog in the New Forest, where they were attracted freely to the flowers of *Angelica sylvestris*, upon which both sexes would alight very gently and circumspectly, after hovering for a moment or two before settling; Adams took it at Lyndhurst, in the same vicinity, in 1902. With us it is probably confined to the southern counties, since I have never met with it in Suffolk.

Its range extends throughout Europe; Herr Graff has bred it in Germany from *Eumenes coarctata* at the end of May, and Schmiedeknecht records it from *Eumenes pomiformis*, while, in France, Laboulbène instances *Eumenes* sp. and *Osmia adunca* as its hosts.

¹ *Ophion clavator*, Fab., suggested as a synonym of this species by Thomson, is *Exetastes cinctipes*, Retz. (cf. Morl. E.M.M. 1903, p. 159).

Concerning the economy of this species, Marshall (*Braconides d'* Europe, i. 294) says he found three parasites in a single nest of *Eumenes coarctata*, taken near Bournemouth, and that they were all different—a *Linoceras*, a *Camplex* and a Braconid (*Rhogas modestus*, Reinh.).

XYLOPHURUS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 169; *Echthrus*, Gr. I. E. iii. 861 (part); *Macrocryptus*, Thoms. O. E. v. (1873), 486.

Head cubical, vertex broad, cheeks tumidous; clypeus short, laterally depressed and apically distinctly dentate in the centre; mandibles basally sub-gibbose. Antennae with flagellum filiform and scape excised beyond the centre. Epomiae distinct, notauli elongate; petiolar area rarely entire, spiracles oval. Scutellum somewhat convex. Abdomen elongate, alutaceous; basal segment apically curved, its dorsal carinae distinct and extending beyond the spiracles, which are situated behind the centre, and its lateral carinae also distinct; eighth segment produced; terebra elongate. Tibiae nearly mutic, front ones of ♀ intumescant and basally constricted; fourth tarsal joint bilobed. Radial nervure sub-inflexed; areolet laterally convergent above; nervellus intercepted below the centre, the median nervure straight.

In placing this genus among the *Cryptini* and dismembering it from the true *Echthrus* of Gravenhorst, I follow Thomson, who says of *Macrocryptus* (O.E. 487) that the petiole is less distinctly bordered and the petiolar spiracles are placed further behind the centre. It agrees with *Cryptus* in its most salient features, but differs in the more cubical head with buccate cheeks, centrally dentate clypeus, the length of the terebra and of the female's eighth dorsal segment and strongly inflated front tibiae. The same author considers (*lib. cit.* 776) that the restricted genus *Echthrus* is probably also referable to the *Cryptini*, while retaining it among the Pimplids, from all of which, however, it differs in its pentagonal areolet, entire petiolar area and bilobed fourth tarsal joint. Of the British species of *Echthrus* (*sensu lato*) Schmiedeknecht gives in his *Opuscula Ichneumonologica*, p. 475, only *lancifer* under *Xylophurus*, retaining *E. reluctator*, Linn. (as does Marshall in 1872) and *E. nubeculatus*, Grav. (*cf.* Trans. Ent. Soc. 1887, p. 379), presumably under *Echthrus* (*sensu stricto*) among the Pimplids (*cf.* E.M.M. 1902, p. 174). For the metamorphoses of *E. usurpator*, *cf.* Xamheu, *Naturaliste*, 1895, p. 78 et 1899, p. 128. One of Brischke's species, *E. armatus*, is said to prey upon *Leucania obsoleta*.

1. *lancifer*, Grav.

Echthrus lancifer, Gr. I. E. iii. 867; *Tasch. Zeits. Ges. Nat.* 1865, p. 303, ♀; *Brisch. Schr. Nat. Ges. Danz.* 1880, p. 128, ♂. *Macrocryptus lancifer*, Thoms. O. E. v. 487, ♀, *cf.* xxi. 2354; *lib. cit.* 2377, ♂. *Cryptus tumidus*, Desv. Cat. 56, ♀.

Head immaculate, transverse, tumidous, parallel-sided, with eyes not prominent and occiput convex. Antennae filiform, slender, shorter than body, black; of ♀ ferruginous beneath, with their central joints white. Thorax and scutellum black; metathorax rugulose throughout, with two transverse sinuate basal, but no apical, costae; spiracles distinctly

elongate; notauli deeply impressed. Abdomen of ♀ oblong ovate and as broad as thorax, of ♂ narrow and sub-linear; black, with three or four basal segments, except sometimes base of first, red, and the fifth often basally castaneous; post-petiole quadrate, irregularly punctate, sub-glabrous and sub-foveate between the carinae, gradually explanate apically; terebra as long as abdomen, spicula ferrugineous, sheaths black, with apices white or rufescent. Legs slender, red or castaneous, with coxae and trochanters, and the hind tarsi, brunneous; ♀ with front tibiae strongly intumescent. Wings of ♂ hyaline, of ♀ somewhat clouded, with apex and a short fascia beneath stigma darker; radix and tegulae black; areolet pentagonal; nervellus in ♂ (Brischke says) intercepted in centre. Length, 1.4 mm.

Thomson mentions a variety in which the petiolar area is complete.

The type of Desvignes' species in the British Museum is nothing but a ♀ of the present species, and is labelled, "*tumidus*, D." His description should be amended:—The black segments are not apically red; the three basal segments are red; flagellar joints six to nine are entirely white, and the wings are but very slightly clouded below the stigma.

Bridgman records this species as new to Britain, though it was known under a distinct name to Desvignes, and is probably not uncommon, from Walmer, early in August, 1886 (Trans. Ent. Soc. 1887, p. 379), and remarks that the specimen is in his collection. Mr. Albert Piffard has recently taken this insect at Felden in Herts. On the Continent it is common in the northern and central countries.

NYXEOPHILUS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 187 (*nec* Thoms. Ann. Soc. Fr. 1885, p. 18).

Head sub-quadrate, as broad as thorax; clypeus very small, Antennae slender, filiform. Mesonotum centrally depressed, notauli deeply impressed and basally foveate; metathorax with only one (apical) costa above the short petiolar area and with the basal area sub-triangular; spiracles elongate-oval, mesosternum distinctly sulcate laterally. Abdomen sub-petiolate, elongate; petiolar carinae distinct nearly to apex, its spiracles situated slightly before the centre; gastrocaeli small and oblique, terebra only a little shorter than the whole body. Front legs short, their femora curved, apically compresso-dilated and attenuate, their tibiae in ♂ slightly incrassate, in ♀ strongly intumescent with the base and towards the apex constricted. Areolet large, pentagonal; nervelet distinct, nervellus not intercepted below the centre.

Förster's short synopsis of genera has led to much confusion, and it were, I think, better if authors had ignored it in nomenclature, especially as no types are instanced. Thomson (*loc. cit.*) referred species which are considered to appertain to *Kaltenbachia* to this genus, and Schmiedeknecht (Opusc. Ichn. 495) says *Nyxeophilus* is very probably Thomson's *Hophocryptus*. As to its most natural position, *cf.* my paper in the E.M.M. 1902, p. 174, where it is found, like *Xylophurus*, to be connected with *Hygrocryptus*. I am by no means satisfied that *N. Corsicus* is not known on the Continent under another designation.

1. *Corsicus*, Marsh.

Nyxeophilus Corsicus, Marsh. E.M.M. 1901, p. 291, ♀; Morl. lib. cit. 1902, p. 173, ♂ ♀.

A large black species, with quadrate head and broadly pale-banded antennae. Head black, irregularly and not very closely punctate; broadly tumidous behind the sub-emarginate eyes; vertex convex, occiput centrally bifoveate; face rugulose, with short black pilosity; clypeus glabrous and centrally mucronate; mandibles stout, sub-rufescent, with the lower tooth almost the longer. Antennae filiform, black, with flagellar joints cylindrical and four to nine of ♀, seven to fourteen of ♂, stramineous; the apical of ♀ short and truncate, the penultimate clothed in dense pale pubescence. Thorax immaculate, pro- and meta-notum scabrous; mesonotum somewhat confluent punctate and nitidulous, anteriorly vertical, with notauli deeply impressed and forming a discal depression; metathorax with apical costa laterally strong, but only indistinct indication of central area; petiolar area short and not discreted, apophyses stout; mesopleural sulci distinct. Abdomen black and glabrous, of ♀ often obsoletely castaneous centrally, of ♂ narrower; basal segment stout, gradually explanate and bicarinate throughout; terebra nearly length of body. Legs elongate, black; front tarsi, tibiae and apices of femora of ♀ pale red, their femora constricted at apex, tibiae strongly intumescent and the apical tarsal joint inserted before apex of penultimate; of ♂ infusate, with the tibiae sinuate. Wings ample and hyaline; tegulae, radix and the narrow stigma infusate; areolet pentagonal, somewhat narrow; nervelet distinct and nervellus intercepted above its centre. Length, 15 mm.

It is just possible from the structural descriptions of Holmgren (Sv. Ak. Handl. 1860, n. 10, p. 72) and Taschenberg that this insect is synonymous with *Ichneumon reluctator*, Linn., which has the antennal joints eleven to sixteen in the male and seven to eleven in the female white; segments two to three or four entirely red, the fifth and in ♀ apex of first castaneous; the legs red, with their bases, hind tibiae, and sometimes the posterior femora, black.

This very distinct species, shortly after its discovery by Bignell in Corsica, was found to be not uncommon in the New Forest, in May and June, by Miss Chawner and Adams (in my collection); by Dr. Sharp, his daughter and C. G. Lamb (in the Camb. Museum); it also figures in Stephens' and Desvignes' collections (in the British Museum) as *Echthrus reluctator*; and C. W. Dale tells me that his father took it in the same locality, in May, 1838. Chitty has found it at Huntingfield near Faversham, in May, 1901 and 1904.

Catalogue.

A CLASSIFIED LIST OF THE BRITISH CRYPTINAE AS ENUMERATED
IN THIS VOLUME.

Order. **HYMENOPTERA.**

Section. *ICHNEUMONIDEA.*

Family. *ICHNEUMONIDAE.*

Sub-family. *CRYPTINAE.*

Tribe. **PHYGADEUONIDES.**

Sub-tribe. **PHYGADEUONINI.**

HELCOSTIZUS, Först.

1. *brachycentrus, Grav.*

GIRAUDIA, Först.

1. *congruens, Grav.*

COELOCRYPTUS, Thoms.

1. *rufinus, Grav.*

PLECTOCRYPTUS, Thoms.

1. *digitatus, Gmel.*
2. *leucopsis, Grav.*
3. *grisescens, Grav.*
4. *tinctorius, Grav.*

TRICHOCRYPTUS, Thoms.

1. *cinctorius, Fab.*
2. *aquaticus, Thoms.*

CRATOCRYPTUS, Thoms.

1. *furcator, Grav.*
2. *stomaticus, Grav.*
3. *anatorius, Grav.*
4. *subpetiolatus, Grav.*
5. *parvulus, Grav.*
6. *tarsatus, Bridg.*

DEMOPHELES, Först.

1. *caliginosus, Grav.*

CUBOCEPHALUS, Ratz.

1. *fortipes, Grav.*
2. *nigriventris, Thoms.*
3. *brevicornis, Tusch.*
4. *oviventris, Grav.*

MICROCRYPTUS, Thoms.

1. *rufipes, Grav.*
2. *perspicillator, Grav.*
3. *arrogans, Grav.*
4. *flavopunctatus, Bridg.*
5. *subguttatus, Grav.*
6. *improbis, Grav.*
7. *rufoniger, Bridg.*
8. *graminicola, Grav.*
9. *Spinolae, Grav.*
10. *bifrons, Gmel.*
11. *abdominator, Grav.*
12. *errator, Marsh.*
13. *arridens, Grav.*
14. *galactinus, Grav.*
15. *leucostictus, Grav.*
16. *nigrocinctus, Grav.*
17. *cretatus, Grav.*
18. *larvatus, Grav.*
19. *basizonius, Grav.*
20. *sericans, Grav.*

MICROCRYPTUS—*continued.*

21. tricinatus, *Grav.*
22. erythrinus, *Grav.*
23. sperator, *Müll.*
24. graviceps, *Marsh.*
25. brachypterus, *Grav.*
26. micropterus, *Grav.*
27. labralis, *Grav.*

ACANTHOCRYPTUS, *Thoms.*

1. nigricollis, *Thoms.*
2. flagitator, *Rossi.*
3. Hopei, *Morl.*
4. quadrispinosus, *Grav.*
5. nigrita, *Grav.*

OBISIPHAGA, *Morl.*

1. stenoptera, *Marsh.*

CREMNODES, *Först.*

1. atricapillus, *Grav.*
2. paradoxus, *Bridg.*

GLYPHICNEMIS, *Först.*

1. profligator, *Fab.*
2. vagabunda, *Grav.*
3. Suffolciensis, *Morl.*
4. clypealis, *Thoms.*
5. parviventris, *Grav.*
6. brevis, *Grav.*
7. erythrogastra, *Grav.*
8. senilis, *Gmel.*

PHYGADEUON, *Grav.*

1. bitinctus, *Gmel.*
2. rufulus, *Gmel.*
3. nyctemerus, *Grav.*
4. speculator, *Grav.*
5. sodalis, *Tasch.*
6. procerus, *Grav.*
7. Heinemanni, *Först.*
8. Gravenhorsti, *Först.*
9. vagans, *Grav.*
10. rusticellae, *Bridg.*
11. rugulosus, *Grav.*
12. Scoticus, *Marsh.*
13. leucostigmus, *Grav.*
14. nanus, *Grav.*
15. brachyurus, *Thoms.*

PHYGADEUON—*continued.*

16. cephalotes, *Grav.*
17. flavimanus, *Grav.*
18. variabilis, *Grav.*
19. assimilis, *Grav.*
20. dumetorum, *Grav.*
21. exiguus, *Grav.*
22. mixtus, *Bridg.*
23. ambiguus, *Grav.*
24. Marshalli, *Bridg.*
25. hercynicus, *Grav.*
26. brevitaris, *Thoms.*
27. nitidus, *Grav.*
28. ovatus, *Grav.*
29. fumator, *Grav.*
30. inflatus, *Thoms.*
31. scaposus, *Thoms.*
32. dimidiatus, *Thoms.*
33. rotundipennis, *Thoms.*

PANARGYROPS, *Först.*

1. tenuipes, *Grav.*
2. collaris, *Thoms.*
3. aereus, *Grav.*
4. pellucidator, *Grav.*
5. tenuis, *Grav.*
6. tenerrimus, *Grav.*
7. claviger, *Tasch.*

ORESBIUS, *Marsh.*

1. castaneus, *Marsh.*

Sub-tribe. **HEMITELINI.***Group.* **Hemiteloides.**ORTHOPELMA, *Tasch.*

1. luteolator, *Grav.*
2. brevicornis, *Morl.*

SPINOLIA, *Först.*

1. maculipennis, *Grav.*
2. fulveolata, *Grav.*

HEMITELES, *Grav.*

1. pullator, *Grav.*
2. inustus, *Grav.*
3. fulvipes, *Grav.*
4. marginatus, *Bridg.*
5. submarginatus, *Bridg.*

HEMITELES—*continued.*

6. scabriculus, *Thoms.*
7. varitarsus, *Grav.*
8. capreolus, *Thoms.*
9. conformis, *Gmel.*
10. infirmus, *Grav.*
11. necator, *Grav.*
12. bicolorinus, *Grav.*
13. longicauda, *Thoms.*
14. areator, *Panz.*
15. cingulator, *Grav.*
16. pictipes, *Grav.*
17. varicoxis, *Tasch.*
18. castaneus, *Tasch.*
19. pedestris, *Fab.*
20. subzonatus, *Grav.*
21. contaminatus, *Grav.*
22. incisus, *Bridg.*
23. brunneus, *Morl.*
24. limbatus, *Grav.*
25. floricator, *Grav.*
26. albomarginatus, *Bridg.*
27. niger, *Tasch.*
28. melanogaster, *Thoms.*
29. tristator, *Grav.*
30. sordipes, *Grav.*
31. cynipinus, *Thoms.*
32. similis, *Gmel.*
33. auriculatus, *Thoms.*
34. melanarius, *Grav.*
35. obscurus, *Bridg.*
36. laevigatus, *Ratz.*
37. biannulatus, *Grav.*
38. hemipterus, *Fab.*
39. scrupulosus, *Grav.*
40. chionops, *Grav.*
41. rufocinctus, *Grav.*
42. varicornis, *Grav.*
43. dubius, *Grav.*
44. ridibundus, *Grav.*
45. balteatus, *Thoms.*
46. imbecillus, *Grav.*
47. persector, *Parf.*
48. tenuicornis, *Grav.*
49. oxyphimus, *Grav.*
50. meridionalis, *Grav.*
51. macrurus, *Thoms.*
52. argentatus, *Grav.*
53. nitidus, *Bridg.*
54. decipiens, *Grav.*
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56. aestivalis, *Grav.*
57. hadrocerus, *Thoms.*
58. minutus, *Bridg.*
59. gracilis, *Thoms.*
60. micator, *Grav.*
61. subannulatus, *Bridg.*
62. melanopygus, *Grav.*
63. anglicanus, *Morl.*
64. distinctus, *Bridg.*
65. validicornis, *Thoms.*
66. politus, *Bridg.*

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CECIDONOMUS, *Bridg.*

1. Westoni, *Bridg.*
2. xylonomoides, *Morl.*
3. inimicus, *Grav.*
4. gallicola, *Bridg.*

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2. aquisgranensis, *Först.*
3. Kiesenwetteri, *Först.*
4. zonatus, *Först.*
5. vulpinus, *Grav.*
6. costatus, *Bridg.*
7. rufipes, *Först.*
8. cautus, *Först.*
9. aemulus, *Först.*
10. vulnerans, *Först.*
11. canaliculatus, *Först.*
12. pilosus, *Capron.*
13. acarorum, *Linn.*
14. mandibularis, *Thoms.*
15. festinans, *Grav.*
16. hieracii, *Bridg.*
17. nigrinus, *Först.*
18. spinulus, *Thoms.*
19. tener, *Först.*
20. micrurus, *Först.*
21. formicarius, *Fab.*
22. Mülleri, *Först.*
23. vagantiformis, *Bridg.*

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24. *distinctus*, Först.
25. *analıs*, Först.
26. *attentus*, Först.
27. *tonsus*, Först.
28. *pumilus*, Först.
29. *gonatopinus*, Thoms.
30. *anthracinus*, Först.
31. *vagans*, Oliv.
32. *fraudulentus*, Först.
33. *impotens*, Först.
34. *timidus*, Först.
35. *bicolor*, Grav.
36. *ochraceus*, Först.
37. *modestus*, Först.
38. *agilis*, Grav.
39. *pulicarius*, Fab.
40. *tristis*, Först.
41. *carnifex*, Först.
42. *nigricornis*, Först.
43. *corruptor*, Först.
44. *gracilis*, Först.
45. *brevis*, Bridg.
46. *Steveni*, Grav.
47. *instabilis*, Först.
48. *Försteri*, Bridg.
49. *cursitans*, Grav.
50. *detritus*, Först.
51. *pedicularius*, Fab.
52. *comes*, Först.
53. *fasciatus*, Fab.
54. *palpator*, Grav.
55. *geochares*, Först.
56. *intermedius*, Först.
57. *hyponomeutae*, Bridg.
58. *indagator*, Först.

THAUMATOTYPUS, Först.

1. *Billupsı*, Bridg.

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2. *pavoniae*, Scop.
3. *dryadum*, Curt.
4. *blandus*, Grav.
5. *deplanatus*, Grav.

ATRACTODES, Grav.

1. *vestalis*, Hal.
2. *bicolor*, Grav.
3. *gilvipes*, Holmgr.
4. *citator*, Hal.
5. *gravidus*, Grav.
6. *compressus*, Thoms.
7. *subrufus*, Grav.
8. *piceicornis*, Hal.
9. *exilis*, Hal.
10. *salius*, Hal.
11. *croceicornis*, Hal.
12. *foveolatus*, Grav.

EXOLYTUS, Holmgr.

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2. *petiolaris*, Thoms.
3. *scrutator*, Hal.
4. *splendens*, Grav.

MESATRACTODES, Morl.

1. *properator*, Hal.

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2. *linearis*, Grav.

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2. *obnoxius*, Grav.
3. *albinotatus*, Grav.

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SPIOCRYPTUS, Thoms.

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2. *cimbicis*, Tschek.
3. *migrator*, Fab.
4. *fumipennis*, Grav.
5. *abbreviator*, Fab.

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7. nubeculatus, *Grav.*
8. amoenus, *Grav.*

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2. ornatus, *Grav.*

HOPLOCRYPTUS, *Thoms.*

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2. confector, *Grav.*
3. fugitivus, *Grav.*
4. nigripes, *Grav.*
5. subcinctus, *Grav.*
6. dubius, *Tusch.*

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CAENOCRYPTUS, *Thoms.*

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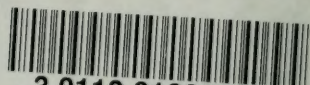
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